

MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 9

APRIL, 1937

Number 11

CONTENTS

A
Magazine
for
Mechanical
Executives:
Construction
Production
Maintenance

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Issue

BUILDING THE LINK-BELT ORGANIZATION OF THE FUTURE	61
By George Applegren	
MODERN EQUIPMENT SAVES MONEY FOR THIS MANUFACTURER	70
SAFETY IN THE MACHINE SHOP.....	76
By R. A. Shaw	
HYDRAULIC POWER AND ITS APPLICATIONS TO MODERN INDUSTRY, II.....	92
By Walter L. Tann	
FINISHING CEMENTED CARBIDES.....	108
By Henry R. Power	
FITTING PUNCHES AND DIES BY ROTARY FILING.....	116
By A. G. Schaad	
MODERN EQUIPMENT AT WORK	
—Novel Transfer System for Overhead Cranes.....	122
IDEAS FROM READERS	
—Flexible Depth Gage, by David Fliegelman.....	128
—Combination Rigid and Flexible Tool Holder, By Roger C. Dickey.....	130
—Machining Tracks for Rotary Drawbridge, By Francis A. Westbrook.....	132
—Link-Type Reciprocating Cam Slide, By John A. Honegger.....	134
OVER THE EDITOR'S DESK.....	138
NEW SHOP EQUIPMENT.....	140
"THERE'S ONE IN EVERY SHOP", By Wesser.....	244
INDEX TO ADVERTISEMENTS.....	246

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MODERN Machine Shop

CINCINNATI, OHIO

APRIL, 1937

Vol. 9, No. 11

Building the Link-Belt Organization of the Future

The author tells how this forward-looking firm is insuring itself against the possibility of a future shortage of capable executives

BY GEORGE APPLEREN

AN apprentice training school that isn't an apprentice training school at all, but that is a proving ground where the men who may be running the company twenty years from today are being put through the jumps from the ground up — that describes the Link-Belt Company's effort to develop its youth and man power. Calling it an apprentice training school is simply a lazy man's way of using a term that will be easily understood.



E. L. BERRY

The run of apprentice schools takes boys in their late 'teen years of average or slightly better than average education, preferably those with technical high school training, and gives them three or four years of training in the shop and factory. Sometimes the

idea is to organize them into "flying squadrons" or "mop-up-crews" who can be sent into emergencies. The general thing is to have class room lectures to supplant the shop training, to give examinations that must be written and are graded, and when the training has been completed to give a diploma. The diploma is taken to mean that the holder is a finished mechanic.

Link-Belt Company's plan doesn't do any of these things. Just about everything in the plan is done directly counter clock-wise to the accepted order. There are no instructors or lecturers, because there are no class-rooms. There are no examinations, and neither are any records kept to tell whether young Bill Smith performed better on this ma-

chine than he did on the one in another department, or if young Jim Jones shows promise of becoming a better worker than Al Brown. Bill Smiths isn't going to perform on machines anyhow, and if Jim Jones happens to outshine Al Brown in one thing chances are that Al will have it all over Jim in something else. These are superficial things and Link-Belt isn't interested in superficial things.

What, then, if the customary procedure has been so thoroughly tossed aside, does the company hope to accomplish by its plan?

The answer is supplied by E. L. Berry, assistant general manager of the Chicago plant, who helped to lay out the courses in vogue at the various Link-Belt plants throughout the country and who has been given the responsibility of seeing that they are successful at the Pershing Road plant, Chicago. Says Mr. Berry:

"We are trying to develop that rarest thing in business—which is objective thinkers, men who can think in a straight line."

Again, is the company really sincere when it says that the boys and young men who are being trained today will be running the company twenty years from today? Mr. Berry is emphatic about this, but he qualifies it with "some of them a whole lot sooner."

The Link-Belt plan of apprentice training is different in many respects from the routine system. It starts its apprentices at a higher rate of pay than is usually paid to apprentices, and they are given raises every six months until the individual wage has reached the top rate for the particular shop department. On this Mr. Berry suggests that the young man who is being groomed for an important executive position is surely worth as much as the day laborer who sweeps out and who can never be looked to to fill any better job.

Some companies figure their apprentice training is costing them money, and hint that they are doing a philanthropic service to their communities. Link-Belt says that not only is its plan being run without cost but that it is paying dividends, and there is no thought or suggestion that what the company is doing is in any way philanthropic or paternalistic.

Some companies employing as many as 6,000 men will have enrollments of as many as 300 in their apprentice training schools. Link-Belt's school at the Pershing Road plant has an enrollment of 35, but there are many others who work at the plant during their vacations and who attend school during the winter months, or who are attending night schools or taking correspondence school courses, who are not apprentices but who may take the plant courses later. Speaking of these, Mr. Berry calls these the "youngsters." Company officers generally have little time to give to apprentice work. Link-Belt officers, from president Alfred Kauffmann, to Mr. Berry and on down the line, share the enthusiasm of every man taking the courses. Mr. Berry can call them all by their first and last names (and he knows most of them by their nicknames). He knows their personal intimate histories, what their home lives are, and about their likes and dislikes—and he holds their confidences and has their unqualified friendships because they know he is interested in them and in their futures.

The procedure in some apprentice schools is to herd the apprentices into class rooms, or to hold them at machines in out of the way corners until the operations become monotonous drudgery. Link-Belt apprentices may be working alongside of their fathers and their fathers' friends, in the shop, and when they have learned about one operation they are moved along to another where they are in new surroundings and where they have new things

to do and new things to think about. They may be at one operation only a week or they may be there longer, all depending, but they are never allowed to become tired of what they are doing.

The plan is one of parts and sections. There is first the grouping of those with technical high school, night school or correspondence school education. Then there is the grouping of those who are graduates of engineering colleges and who have degrees. Courses for the former are called "specific", and for the latter they are known as "general". The specific courses take from five years to more than seven years to complete. The general courses require two years.

That the plan has become such a success is due in part to the way in which apprentices are selected. Link-Belt never hires anyone with the idea that he is to take its apprentice courses. Neither does it go out into the technical schools and enlist them. They are picked from the working personnel, and before they are picked they have first to show they want to become successes and that they have the necessary stuff to be successes. They all applied at the office of Stanley Staskey, employment manager, for work, and filled out the regular employment form. This form, incidentally, is the only one they are ever asked to sign. The company has no contracts binding them to stay with it or to make releases of inventions or ideas.

Actually, from this it can be seen that the company's contact with the apprentice starts long before he ever begins taking his apprentice training. In some cases this has been as long as six years. There is such a case that can be used for illustration.

Six years ago this coming summer a boy who had just finished his sophomore year in a Chicago technical high school applied at Stas-

key's office for work. He said he planned to study mechanical engineering and wanted to get some practical experience. When school started that fall he quit, but before the school year was out the company wrote a letter asking if he wouldn't like to come back during his next vacation. He graduates in June with second highest honors in his class from a Big Ten university's engineering school. He has worked in the plant every summer, and he will begin the general training course.

To Mr. Berry, this young man has always been, and is yet, one of "the youngsters." But the story is not yet finished. He was recently offered a position with another company at a salary offer that was entirely commensurate with what an honor student might expect. He delayed accepting it to see if he could begin Link-Belt's apprentice training course. Mr. Berry said he could. He is not being shown favors, but his pay is to start at the regular apprentice base. He snapped at the chance. Mr. Berry, curious to know what was behind his move to turn down the more flattering offer with its higher wage to start at the bottom, asked his reasons. Here was the reply he got:

"If I do the work you expect of me, I'm sure that I'll be a whole lot farther ahead ten years from now."

This honor graduate from the engineering school will spend his first week learning the preparation of work tickets, operating symbols, etc. He will spend his second week in the pattern department, where he will learn about pattern storage and shop routing of pattern orders. (Link-Belt has more than 55,000 active patterns, so there will be little monotony for him there). Two weeks in the core room, two as a molder's helper, two on the sprocket floor, another two weeks in the South End shop, one



The Link-Belt 1936 Apprentice-Training Group. At the left

is Mr. E

on the metals and charging floor, two at foundry production, four in learning about foundry rate setting, two on machine shop rough stock, two at machine shop inspection, three in machine shop planning, one in machine shop routing, one at machine shop time keeping, and then six weeks in learning machine shop rate setting. That completes his thirty-second week as an apprentice.

Out of the machine shop, he will have to spend a week in the steel stores, two at steel shop lay-out, he becomes a machine shop steel helper for two weeks, spends the next two weeks as a steel shop floor helper, followed by one week doing steel shop arc welding, three in the steel shop chain department, three more doing steel shop planning, and he will wind up his first year with four weeks spent learning about steel shop rate setting. Each week he will have to work five eight-hour days.

His second year will begin in the receiving room where he will have to spend one week. This is to be followed by a week spent learning about balance of stores, two in the stock room, two in the shipping department, one in traffic study, four in production of engineering and manufacturing, six weeks in accounting and cost studies, seven

weeks at pricing, six of construction work (which he will get in the field), eight of engineering routine, four in the purchasing department where he meets and talks with salesmen and actually makes company purchases, one week at employment, five on cranes studying assembly, service and operation costs, and he will spend the last two weeks with Mr. Berry in his office.

The first year, according to this schedule, will take this honor graduate through the shops. He will spend the second year as an executive assistant. It may not be necessary for him to complete the entire second year's course of routine, and if he feels that he holds an especial liking for the work in a particular department, where he may feel that he has "discovered himself," he may apply to Mr. Berry to be assigned to that work. Only the other day such a case arose when an apprentice nearing the finish of his training asked to be assigned to the crane sales department. Mr. Berry asked him why he thought he might fit into the sales division. He told that in addition to his regular plant studies he has been attending night school studying salesmanship.

In telling about it, Mr. Berry showed that he has the utmost con-

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Mr. E. L. Berry; at the right end, Mr. Stanley Staskey.

confidence that this man will make a good salesman.

It was said earlier that there are no written examinations which are graded. That is true, but apprentices are urged to write papers setting down their observations and telling about what they have learned when they pass from one department to the other. These papers are read by Mr. Berry and the department head in which the training was given, and are carefully reviewed. But they are not graded. And, while it is not compulsory that the papers be done it is advisable that they are, for should an apprentice neglect entirely to do them it may be taken as an indication that he hasn't the stuff the company expects him to have. This has never occurred, however.

The specific courses are for those who are not engineering school graduates with degrees. They cover the foundry, machine shop and steel shop. In certain minor respects they overlap, but in the main essentials they hew to their own shops. Because apprentices taking these courses have not had the benefit of a university education, but have largely educated themselves in night schools and through home studies, these courses run longer. The foundry

course requires 84 weeks to complete. The machine shop course is the short one and is finished in 60 weeks. The steel shop training course is the long one and runs through 88 weeks.

A slight divergence must be made here from the earlier statement that no class room studies are held. Apprentices in the specific courses spend one day in each week during their first two years at the Washburne School—which engineering course is sponsored by the National Metal Trades—in studying drawing and mathematics pertaining to the trade. Link-Belt pays them their regular wage for the days so spent.

How all this has affected the general employee morale may be understood from the fact that shop mechanics, instead of showing resentment at contact with apprentices (who might ask what seem to be foolish questions), show a keen delight in teaching them. This feeling has been made noticeable throughout the entire plant. Perhaps it is because they know that the apprentices are not being trained to take away their jobs. Old employees have suggested to boys in the 'teen years that they can well profit by attending night schools and fitting themselves for the plant

courses. Spurred by such suggestions the boys have sought advice from their foremen and from Mr. Berry as to schools, courses which they should take and so on. It may be politics that urges them to seek this advice, but it nevertheless shows their interest.

Indicating further the enthusiasm which Link-Belt apprentice courses command from the younger element in the plant personnel, there is the Junior Engineers Club—that is made up of apprentices, the "kids" and others under 25 years. The club runs itself, without any help from the company other than supplying speakers for its monthly meetings when it is asked to furnish them. Those over 25 years of age may become members of the company's Engineers and Foremans Club. The company has a technical library

which is well patronized, and which subscribes to the technical magazines in its field and has several hundred engineering texts and hand books.

Link-Belt is not being run today by graduates from its apprentice school. The plan was only started in 1932. Throughout the time since it was started, there has been one thing evident—that objective thinkers, men who can think in straight lines, are being developed.

From contacts with the apprentices, and with "the youngsters", both Mr. Kauffmann and Mr. Berry have formed the same conclusion. They agree that the American Youth is still a pretty good investment, and that if given a chance to show his worth and what he can do, under surroundings and in ways which keep his enthusiasm buoyed up—well, he'll go a long, long ways.

Handbook of Engineering Fundamentals. O. W. Eshbach, E.E., M.S., Editor-in-Chief, and 40 contributors. John Wiley & Sons, Inc., New York, 1936. 1081 pages; illustrated; 6 by 9; \$5.00. This is the first volume in the proposed new Wiley Engineering Handbook Series which represents a complete revision of the basic conception of American handbooks. Since mathematics, physics and chemistry form the basis of all engineering, these are the fields dealt with in the new volume.

The first section presents a selection of mathematical and physical tables, including new and revised tables of the American Handbook series, in which particular attention has been given to arrangement, typography and general convenience. In addition to well arranged tables on engineering constants, properties of numbers, logarithms, trigonometric and hyperbolic functions, there is included a series of tables of conversion factors for weights and measures arranged in order of dimensional sequence, tables of integrals, standard structural shapes, and physical properties of metallic and non-metallic materials.

Other sections offer such features as: the presentation of dimension systems, systems of units, standards, and introduction to the theory of dimensional

analysis; the systematically arranged and clearly illustrated fundamentals of theoretical mechanics and mechanics of materials with applications to beams, columns, shafts, and reinforced concrete; the modern theory of fluid mechanics as applied to the fields of hydraulics and aerodynamics; engineering thermodynamics, embodying the latest physical concepts of the fundamentals of heat engineering; the theory of the electric, magnetic and dielectric circuits and their application to generalized networks and transient theory; the fundamental principles of general chemistry, chemical tables and industrial chemistry; the principles of light, acoustics and meteorological phenomena; an extensive handbook treatment of the properties of metallic and non-metallic materials with reference to features of manufacture and use; and a discussion of the elementary legal aspects of contractual relations with which all engineers should be familiar.

An important feature is that of format. With readability in mind, the trimmed page has been fixed at $5\frac{1}{2}$ by $8\frac{3}{8}$ in., permitting the use of a larger type size and larger illustrations and diagrams than was possible in the older type of handbook. This is a volume which every engineer will find a veritable treasure trove of information.

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THAT an actual saving in dollars and cents can be made through the use of modern equipment is strikingly illustrated in the case of a large automotive manufacturer. By replacing 24 machines of an older type with 8 new Radial-Type Simplimatics, 16 machines have been eliminated and two-thirds of the formerly congested floor space has been reclaimed for other use without any decrease in production. More than 1,000 flywheels are pro-

duced in 7½ hours by these new machines, this production being made possible by combining, in one operation on one machine, what formerly required three operations on three machines.

The tools of these machines are arranged radially to the work to permit the maximum number of cutting tools to operate simultaneously. The machines are equipped with a special heavy carriage having a vertical face on which sturdy tool-slides

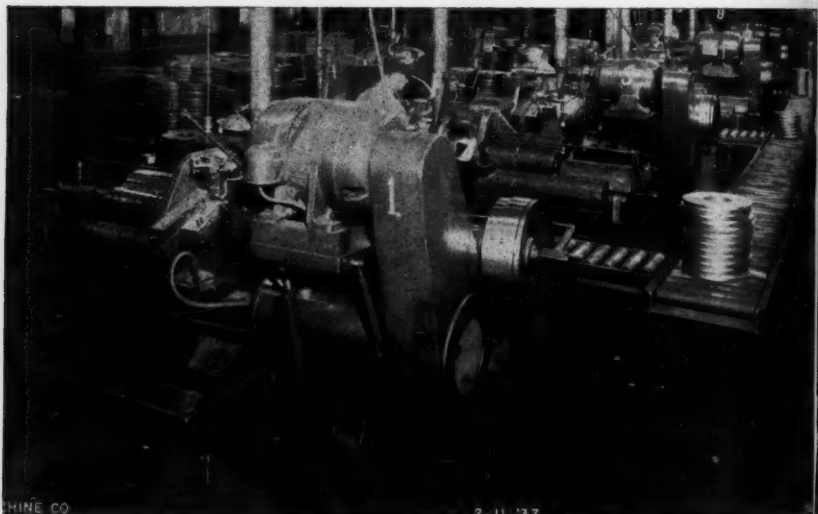


Fig. 1—Flywheels are completely machined at the maximum rate of 44 per hour. 8 Radial-Type Simplimatics replace 24 machines, thus reclaiming ⅔ of the floor space formerly required in this department.

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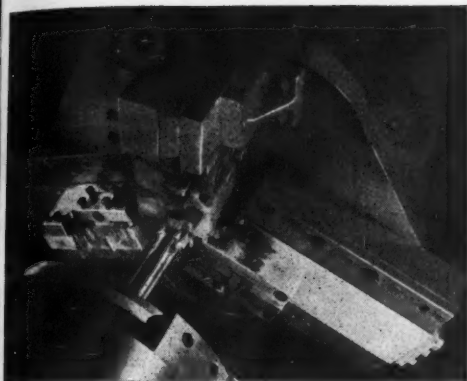


Fig. 2—1st operation: 14 modern cutting tools held in 3 radial slides cut simultaneously—turning, facing, recessing, forming and chamfering operations.

The spindle then starts to rotate and the cam-drum feeds the tools to the required dimensions. Upon the completion of the turning operations, the tool-slides are returned to their starting positions on the master slide, after which the master carriage slide is quickly traversed back to its starting position, and the spindle is stopped. The machine is then ready for reloading.

The most modern cutting tools used on these machines remove approximately $3/32$ inch of stock. The cutting speed is approximately 200 feet a minute, except for the final shaving operation, which is performed at a speed of 100 feet a minute. A feed of about 0.030 inch per revolution has resulted in a long tool life between grinds. On each machine, the flywheels are held in a three-jaw air-operated chuck. They are located on three pins in the chuck face and clamped around the

are mounted close to the work piece with a minimum overhang of the tools, as can be seen in Fig. 2 and 3. The tool-slides are thus brought close to the work and can be applied without excessive overhang or interference. Cam segments, mounted on a single drum, control the movement of the tool-slide. The segments can be changed, if necessary, to provide different timing of the slides for other work and different feeds.

The tooling, which is similar in general arrangement on both machines, includes a central boring and turning slide fed longitudinally and two radially-located slides on which tools are mounted for facing, recessing, forming and chamfering.

The machining cycle is entirely automatic, it being necessary for the operator to move only one lever. The master carriage slide on which the tool-slides are mounted is traversed close to the work by air pressure.

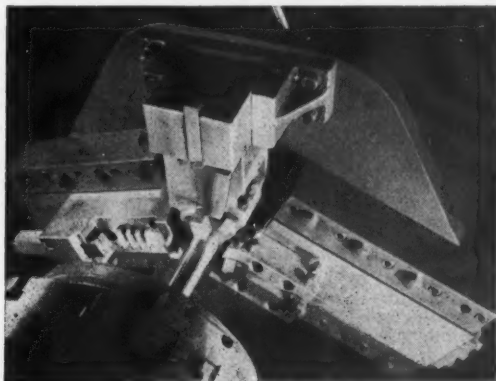


Fig. 3—2nd operation: 15 modern cutting tools held in 3 radial slides—turning, facing, forming, recessing and chamfering operations.

circumference.

The safety factor is greatly increased in these machines because the spindle does not revolve until the cutting tools are close to the work and the spindle is stopped as the master slide is quickly traversed from the work. The starting lever is at the top of the master slide, remote from any revolving parts. Complete automatic lubrication is provided for every important bearing and working surface on the machine.

The bed and headstock are cast from nickel semi-steel. The whole casting is very rugged and is heavily webbed to withstand increased cutting pressures accompanying the modern cutting tools and speeds being used, which is standard construction in all Simplimatics. The headstock walls extend well above the spindle surrounding the spindle bearings with solid support. Heavy cross ribs inside the headstock provide center bearing seats and supply the strength required to maintain shaft alignment.

Full length hardened steel plates are securely attached to the bed ways and then ground in perfect alignment with the spindle. The tool slide bearings are made extra wide and are also surfaced with hardened steel plates. Wear is practically eliminated and greater accuracy is insured. Easy chip removal is provided for at the rear of the machine.

Abrasive Company Grinding Wheels. This book, now being distributed by Abrasive Company, Division of Simonds Saw and Steel Company, Tacony & Fraley Sts., Philadelphia, Pa., contains 180 pages of descriptions, illustrations, and specifications of the grinding wheels made by this firm. Included in this category are vitrified and silicate bonded wheels, shellac bonded wheels, rubber bonded wheels, resinoid bonded wheels, segments, special wheels, coping wheels, rubbing bricks, sticks, cylinder honing sticks, jointer stones, railway track bricks and roll scouring bricks. Cross-

section drawings of the various shapes are shown to aid the purchaser in the selection of the proper type of wheel for his work and specifications give all of the various dimensions. The segments are designed for use with the standard chucks such as those made by Blanchard, Bridgeport, Carborundum, Covel-Hanchett, Crossley, Diamond, Norton, Rogers, Seybold, Springfield and Sterling. A copy of this catalog gratis to any mechanical engineer or plant executive.

A Million Speeds at the Touch of a Finger is the title of a four-page folder presenting, in color, 16 outstanding advantages of the Transitorq. The Transitorq is a variable speed power unit consisting of a constant speed electric motor built in as an integral unit with a transmission, the output speed of which is infinitely adjustable over its entire range. The Transitorq has a high starting torque and absolutely positive drive. The folder presents eight illustrations showing the Transitorq as adapted for a variety of applications. A copy of this folder can be had by addressing New Departure, Division of General Motors Corporation, Bristol, Connecticut.

Holden Hy-Speed Case. A bath for hardening tools with which a balanced type of case effect and minimum of embrittlement are possible at a low melting point is now being marketed by A. F. Holden Company, New Haven, Conn., under the name of "Holden Hy-Speed Case." The Holden Hy-Speed Case employs only one type of cyanide to produce the casing action. The actual cyanogen content of the bath is low and the extremely slow breakdown results in a minimum of change in composition while maintaining the bath with uniform analysis and properties. It is said that a well balanced case is obtained which includes some carburizing effect along with the nitride needles, producing maximum hardness with minimum brittleness. The case can be used from 900 to 1100 deg. F. on high speed tools or those requiring red hardness at elevated temperatures. It constitutes a combination of chemically pure salts never before used in industry for the heat treating of steel in one bath. Copy of this folder available upon request.

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JERSEY CITY—Manning, Max-
well & Moore Co.
KANSAS CITY, MO.—Elfhelt
Hdwe. & Machy. Supply Co.
KNOXVILLE—W. S. Murrian Co.
LANCASTER, PA.—Reilly Bros.
& Raub.
LOWELL, MASS.—Nebes
Machy. & Supply Co.
LOS ANGELES—Ducommun
Metals & Supply Co.
Eccles & Davis Machy. Co.
MILWAUKEE—W. A. Voell
Machy. Co.
MINNEAPOLIS—R. C. Duncan

MOBILE, ILL.—John J.
Normoyle Co.
MONTREAL—Canadian Fair-
banks-Morse, Ltd.
MUSKOGEE, MICH.—Muske-
gon Hdwe. Co.
NASHVILLE—Buford Bros., Inc.
NEWARK—Abrasive Machine
& Supply Co.
NEW HAVEN—C. S. Mernick
Face Steele & Flagg
NEW ORLEANS—Oliver H.
VanHorn Co., Inc.
NEW YORK CITY—Morris
Abrams
Guarantee Specialty Co.
Hansen & York Co., Inc.
ORLANDO, FLA.—Harry P.
Leu, Inc.
PEORIA—Conch & Hoyle, Inc.
PHILADELPHIA—Maddock &
Co.
PITTSBURGH—W. B. Rapp, Machinery
Standard-Ma-
chines Sup. Co.
PORTLAND, ORE.—J. E. Hasel-
tine & Co.
PROVIDENCE—Belcher &
Loomis Hardware Co.
Browell Machinery Co.
REYNOLDS Machinery
READING, PA.—Reading Ma-
chine & Tool Co.

RICHMOND—Smith-Courtney
ROCHESTER, N. Y.—Erekine-
Hensly
ROCKFORD, ILL.—Mid-State
Indus. Corp.
SAGINAW, MICH.—Reichle
Supply Co.
ST. LOUIS—Colcord Wright
Machinery & Supply Co.
SALT LAKE CITY—Salt Lake
Hardware Co.
SAN FRANCISCO—Harros,
Rickard & McCone Co.
C. W. Marwedel
SEATTLE—Cragin & Co.
Seattle Hardware Co.
SOUTH BEND—South Bend
Supply Co.
SPRINGFIELD, MASS.—
Carlisle Hardware Co.
SYRACUSE—Syracuse Supply
TOLEDO—Cornell Supply Co.
Kirkby Mach. & Supply Co.
National Supply Co.
TORONTO—
Canadian Fairbanks-Morse
TROY, N. Y.—Fred K. Blanchard
TULSA—Mach. Tool & Supply
Co.
WORCESTER, MASS.—Waite
Hwy. Co.
YORK, PA.—York Machy. &
Supply Co.
EXPORT DEPT.—Dumore Co.
—New York.

as ten departments or divisions, of which safety is one. The cost per employee hired may vary from \$11 to \$26 for such activities, yet the fact is that in the aggregate the manufacturing cost is lower, due to the benefits that are derived from such activities.

It is common practice in large organizations to appropriate from \$15

actions must prevail.

It is well known to experienced managers that the best mechanic is not necessarily the best foreman. The foreman who thinks progressively, although his mechanical ability may be of mediocre caliber, is to be preferred to the foreman who, while an expert mechanic, may be quite unable to extend his horizon beyond the

mechanical details of his job. Such a department head will be a liability, insofar as the significance of the safety movement is concerned.

Periodically every mechanical executive should ask himself this question: "Is everything possible being done to make this plant a safe place to work? Is everything possible being done to develop and maintain safety interest, and make it effective?"

If both of the above questions cannot be answered satisfactorily what is the trouble? Is it possible that executive interest and control are lacking, or that there has been a failure to issue sufficient instructions or to properly demonstrate the necessity

for adequate safety measures? Perhaps the responsibility can be laid to lack of discipline, which tends to increase the disregard for safety rules and precautions.

An attempt should be made to discover whether or not there are "accident-prone" employees in the organization. Accurate records have many times shown that there are men who, while apparently normal and possessing intelligence enough to carry on their tasks, have a multiplicity of accidents. Such men cannot be



Permanent guards at aisle intersections will promote order and safety.

to \$150 for hiring and breaking in each new employee, the cost varying according to the skill required on the individual operation and the number of men hired. Safety activities, while usually receiving the smallest appropriation, may provide the largest potential saving.

One of the easiest ways to trim manufacturing costs is to trim the accident rate. All workers—both old and new—must be made to understand that all hazards are to be eliminated. Safety thinking and safety

LESS BREAKAGE

WITH
WELDON
DOUBLE END
END MILL

*Every tool made under
Controlled Heat Treatment*

LESS BREAKAGE Because—

1. Weldon uses high speed steel up to its own high specified standards, steel carefully checked chemically and microscopically.
2. Weldon endmills have a cupped end and rugged formed teeth, designed for strength and free cutting.
3. Heat treated by technically trained men, aided by the most modern time and temperature controlled hardening equipment.

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*Pioneers in
Fast Spiral
Double-end End Mills*

The
WELDON
TOOL CO.
321 FRANKFORT AVE.
CLEVELAND, OHIO

"Look for the name WELDON on the tool"

trusted on hazardous jobs, or with the responsibility of expensive equipment. Others, while highly intelligent, are inclined to take chances, with the same disastrous results.

Management has certain responsibilities in the matter of equipment. It has become standard practice in the better plants to furnish free goggles to those who are required to grind tools, or to perform chipping or rough grinding operations. It is also customary to furnish especially-equipped respirators to operators on dry grinding or similar operations where an excess of dust is generated, and to supply steel-faced gloves

where sharp objects are to be handled. Safety-minded employees will appreciate this attitude on the part of the employer, and those who are inclined to resent the order to use such equipment should be considered as a liability in any establishment.

ARE ALL ACCIDENTS PREVENTABLE?

A recent safety survey at the plant of an automobile frame manufacturer revealed the fact that, while some hazards are obvious, others are apparent only to the trained eye. The following inspection report will be interesting in this connection:

Hazard	Cause	Potential Causes Found During One Week Survey	Actual Accidents Occurring During Preceding 12 mths.
Falling material, bad housekeeping.....		9	19
Falling workmen, bad housekeeping.....		7	6
Equipment defect, mechanical.....		5	11
Projecting objects, carelessness.....		1	12
Flying objects, carelessness.....		1	6
Crushing, carelessness.....		1	4
Burns, carelessness.....		1	1
Explosions, carelessness.....		1	0
Working conditions, bad housekeeping.....		2	1
Lifting, carelessness.....		0	1
Total		28	61

This survey accounted for 28 potential accidents as compared with 61 accidents which actually happened

within the preceding two months. Thus the accident causes can be segregated:

	Potential	Actual
Injuries due to poor housekeeping.....	19	38
Injuries due to mechanical defects.....	5	11
Injuries due to carelessness.....	4	12
	28	61

The above report resulted in immediate action. The management lost no time in taking the necessary steps to remedy the poor house-keeping record.

SAFETY IN DESIGN

The adage is that any designer can

design, but it takes a first-class designer to create dies, conveyors, and accessories which can be operated with safety and proficiency. For example, the press room was given the task of producing 12-inch cross members, for which a die was sup-

INSUROK

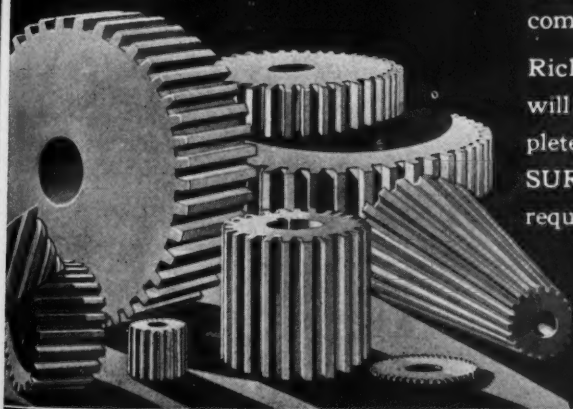
Gears and Pinions

give gear cutters a big competitive advantage

THE increased use of laminated phenolic gears in all types of manufacturing operations opens up a new and profitable field for the gear cutter. INSUROK sheets and gear blanks because of their uniformity of structure, ease of machining, trueness to dimensions, and superior quality, give INSUROK gear cutters

definite advantages over competition.

Richardson engineers will be glad to give complete data showing INSUROK advantages, on request.



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- (1) It produces 500 pieces per hour using unskilled labor.
- (2) The only oil grooving machine that permits loading and unloading the work without stopping the machine.

The Wicaco Continuous Oil Groover is a real profit maker wherever oil grooving jobs of any kind are done. Write for information or send blue prints.

The Wicaco Machine Corp.

Established 1868

Wayne Junction, Philadelphia, Pa.

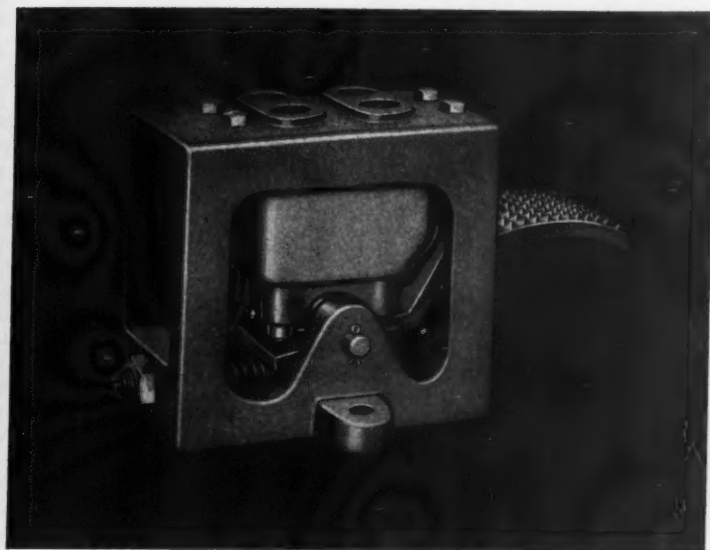
plied that lacked air ejectors or a slide feed with which to place the stock in the die. During the flanging operation the part stuck in the die, slowing up the operation. The operator, becoming exasperated, thrust his hand into the die in order to make up time in removing the piece. The clutch failed and his hand was severed at the wrist.



Operator using a work-holder of the type shown at the head of this article.

To prevent a recurrence of this tragedy the die was relieved so as to allow greater freedom in removing the work-piece. Also, two forged fingers were added to the top section of the die so that on the return trip the piece was lifted out of the die and allowed to fall clear. The manufacturer who furnished the die with which to produce his parts probably never knew of this accident, but the company who paid for the physical loss and the die change was handicapped financially.

Safety talks and verbal orders are important parts of safety work, but definite rules, printed on cards that can be placed in conspicuous places



ROSS Operating Valves

MODEL ST

Four-Way, Foot Controlled, Non-Locking Type for the control of single and double acting cylinders.

Made also in hand, mechanical and solenoid controlled types. All parts interchangeable between different models in like sizes—that means small inventory of spare parts.

Write for new catalog.

ROSS OPERATING VALVE CO.

6488 EPWORTH BLVD.

DETROIT, MICHIGAN

will have a much more definite effect in impressing the employees with the importance of working safely. Such a list should include the following:

SAFETY INSTRUCTIONS TO WELDERS

THIS BOOK, WHEN PROPERLY SIGNED, IS YOUR PERMIT TO WORK WITH OR HANDLE GAS WELDING EQUIPMENT



— Do Not Lose It —

MURRAY CORPORATION OF
AMERICA

MAY 1, 1934

Cover of Safety Instruction Book

1. Running prohibited.
2. Horse-play prohibited, especially with air.
3. Wash before partaking of food or tobacco on certain jobs such as those where paint, lead, or cyanide are used.
4. No visiting with operators of machines.
5. Wear light goggles on all spot-welding operations. Wear spe-

cial No. 6 shade goggles on gas or acetylene welding. Wear special No. 10 or 12 goggles on arc welding.

6. Protect hands and body from cuts on sharp metal edges. Wear wrist sleevelets to protect tendons or arm.
7. Wear goggles on all grinding operations, all chipping operations, on bandsaws, and on shapers, both wood and metal. Foremen must wear special glasses or goggles at all times in metal departments.

It is a good idea to practice 100 per cent rules regarding the wearing of safety equipment, at least as far as possible. For instance, all men in a heavy stamping plant wear shoes with steel caps of sufficient strength so that the toes will be protected from falling objects.

In order to make sure that the employees understand the rules regarding the safe operation of certain types of equipment, at least one large firm incorporates certain rules regarding that equipment in a rule book, copies of which are issued to the employees on those jobs and which must be signed by the employee before they can start work. Having signed the permit in the back of the book, the employee carries the book

with him while operating such equipment as cranes, elevators, welding equipment, wood shapers or joiners, or transportation equipment such as electric or gasoline trucks within the plant.

Safety Instructions to Welders

No matter how small the injury, report to the First Aid at once.

1. In order to safeguard against fires, employees are not to operate acetylene and oxygen welding equipment without first receiving this book with the permit on the last page fully

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signed. See your foreman for further information.

2. Never weld near inflammable material, such as gasoline, benzine, kerosene, alcohol, turpentine, thinner, lacquer, paints, oils, gas, etc. Beware of open flames near drums that have contained any of these. Do not weld near coal dust or cotton.

3. Never weld where spray painting is done or in Spray Paint Shop. Precaution against sparks of any nature is of such importance that welder should warn against even using a steel hammer and chisel, electric portable grinder, or anything that would cause a spark. When cleaning use copper paint scrapers to prevent sparks.

4. For the protection of employees when clothes ignite or catch fire, a woollen blanket must be kept within a container ready for instant use near all jobs that might be considered of an inflammable nature. Burlap aprons are prohibited.

5. It is dangerous to release acetylene gas or oxygen from tank at more than 15 lbs. pressure against the gauge. Under no circumstances should the oxygen pressure be greater than the acetylene pressure when welding.

6. OIL OR GREASE, WHEN COMBINED WITH OXYGEN UNDER PRESSURE, WILL CAUSE A VIOLENT EXPLOSION, AS OIL CREATES HEAT. Therefore, never apply oil to the threads in order to make threads work more easily, nor store the tanks under any section where grease or oil may drop on same.

7. Close the valves on both tanks when

leaving the outfit. In case of fire, shut off pressure if possible. Acetylene cylinders are equipped with explosion Safety Cocks and release at 200 lbs. pressure.

8. An 18-inch valve key must be chained to each acetylene tank, also a pilot light and a BRACKET TO HOLD THE TORCH WHEN NOT IN USE. This equipment MUST be on all outfits.

9. Always see that pressure is released from both diaphragms after shutting off tank valves. (This is done by backing off feed screw until free.)

10. When tanks are empty, make sure to shut off valves tightly and mark plainly "EMPTY."

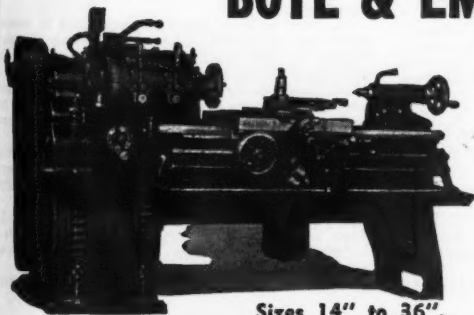
11. Do not try to repair leaking tanks, but tag same and remove from the building immediately. Proper mixture of acetylene and air will cause an explosion if ignited.

12. See that flames or sparks do not touch cylinder or hose. Do not lay torch on tanks or in empty drums, but always on the hook so designated. This hook must face away from the aisles and not even with the eyes of workmen.

13. Do not weld or cut containers such as tanks or barrels as the vapors contained will ignite. Call the Superintendent of Maintenance if requested to do such a job.

14. Foremen must be present when testing tanks or containers, water only to be used when testing. On rare occasions special permission may be obtained to use carbon tetra-chloride. Steam will cut grease and clear out tanks.

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CINCINNATI OHIO



"The Lathe With The Longer Life"

15. When blowing cylinder valve be very careful; open and close quickly.

16. Always tie hose instead of taping them together. It is easier to locate leaks in hose when so tied.

17. Full cylinders should always be kept in upright positions, and held securely. If

lene cylinder as you may damage the Safety Plugs. These release at 200 lbs. pressure.

22. Protect the hose from trucks and from the feet of workmen.

23. When unloading oxygen or acetylene gas tanks, never allow same to fall, but move them carefully, and slide the tanks on to

THE MURRAY CORPORATION OF AMERICA

WELDER'S PERMIT

THIS IS TO CERTIFY THAT:

<p>.....</p> <p>Name</p>	<p>.....</p> <p>Clock Number</p>
<p>has passed an examination on "Safety Regulations for Welders" and is permitted to use welding equipment until permit is revoked.</p>	
<p>.....</p> <p>Foreman</p>	<p>.....</p> <p>Safety Engineer</p>

cylinders are in a group, they should be retained by a rope or cable.

18. When exchanging empty oxygen or acetylene tanks for full ones, observe the following: (a) Shut off valve on empty tank; (b) release thumb screw on regulator; (c) disconnect regulator and connect on full tank, standing on opposite side of tank while opening valve. After tank is open, adjust thumb screw on regulator to proper pressure.

19. Under no circumstances carry a tank by crane or hoist. If for special occasion, a permit must be procured from the Safety Department.

20. Never attempt to repair welding equipment yourself. If equipment is defective, do not use it, mark on shipping tag "DEFECTIVE" and exchange for a new one. Be sure the hose is good and is properly connected. Use hose clamps.

21. Do not put anything on top of acety-

ROPE MAT.

24. Arc welder operators must use a shield, and they should also protect the eyes of other employees by the use of guards or curtains.

25. Arc welders are not permitted to tamper with the electrical apparatus. When the electrodes do not strike the proper arc, call the Electrical Department.

26. Suitable eye protectors are provided and are to be worn by all welders. Be sure the costly dark glass has the plain glass in front in order to protect it.

27. All operators of butt and spot welding equipment must wear the straight type spectacles to prevent flying sparks from injuring their eyes.

28. Always lock the main switch open before attempting to repair electric welders.

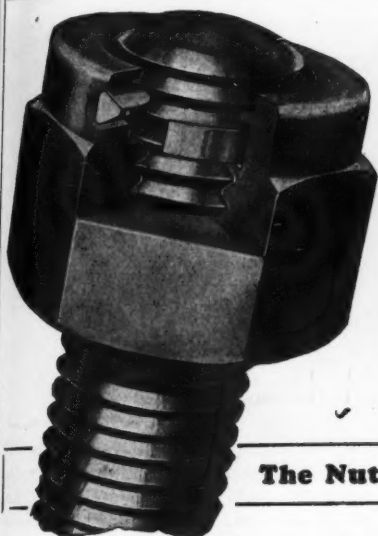
"Be Safe not Sorry. Help yourself by observing these rules."

Industrial Relations.

Safety Department.

NEW PRINCIPLE IN PYROMETRIC HEAT CONTROL. A series of bulletins has been released by the Wheelco Instruments Co., 1112 Milwaukee Ave., Chicago, Ill., on the subject of Pyrometric Heat Control. In these bulletins, prepared by their technical engineers, the Wheelco Company presents an interesting and informative detailed analysis of

their recently developed "Radio Principle" type of Pyrometric control instruments. This "Radio Principle" is entirely new in its application and provides industrial engineers with a new answer to their heat control problems. The booklets may be obtained direct from the Wheelco Company by any interested engineer or executive.



NEW

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Fig. 1510 "Unshako"
Self-Locking Nut.
Cutout section shows the
Locking Ring in position.

UNSHAKO

SELF-LOCKING NUT

IT will pay you to find out all about "Unshako", the nut that can't work loose even when subjected to severe and continuous vibration—yet it backs off readily with the aid of an ordinary wrench. It's self-contained—no separate pins or washers to be forgotten or lost. A built-in, self-locking ring or floating thread that works on the brake band principle, does the trick.

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Mr. Title.....

Firm

Address

Hydraulic Power and Its Applications to Modern Industry, II

Rubber and Plastics Presses—Metal Forming—Production of Aircraft Parts.

BY WALTER L. TANN

Hydraulic Engineer, Farrel-Birmingham Company, Ansonia, Conn.

TURNING from a general consideration of the hydraulic press, let us examine in more detail the types of presses used in the plastics industries, such as rubber, composi-

tion flooring materials, and for the newer conception of molded plastics, such as Bakelite, and so on. These pressures are usually of the tie-rod type, with the bottom crosshead also serving as the cylinder casting for the up-acting ram. Separate heated plates, usually steam heated, are necessary in these industries to transmit heat to the molds or to the materials to be compressed or cured. Asbestos or some other heat-insulating medium is placed between the steam plates and the press platens, although a cast insulating grid with plenty of radiating surface is sometimes used.

Presses for the rubber and some other industries are often made multi-opening—that is, with a number of plates interposed between the top crosshead and the moving ram. This multiplies the production of the press by whatever the number of openings used, as compared to a single-opening press. These multiple plates are spaced to suit the molds or materials and such presses as a matter of convenience are sometimes provided with small hydraulic elevators, directly alongside of the press, to provide means for loading and unloading the plates.

The heated platens used in the

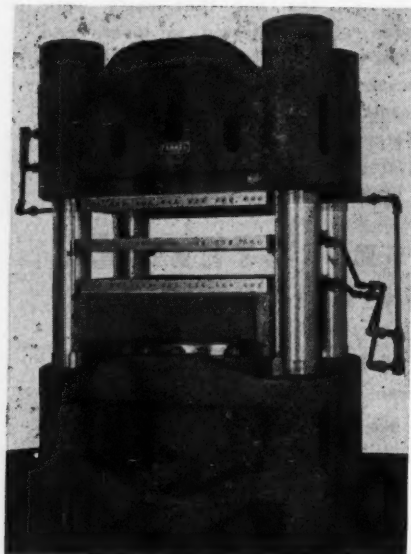


Fig. 4—A very heavy and rugged press of 1000 tons capacity for molding and curing mechanical rubber goods. Press has three steam heated platens, 42" square.

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machine
The
Henry Fre
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Asher
D. S. Ma
Joseph P.
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For these Reasons

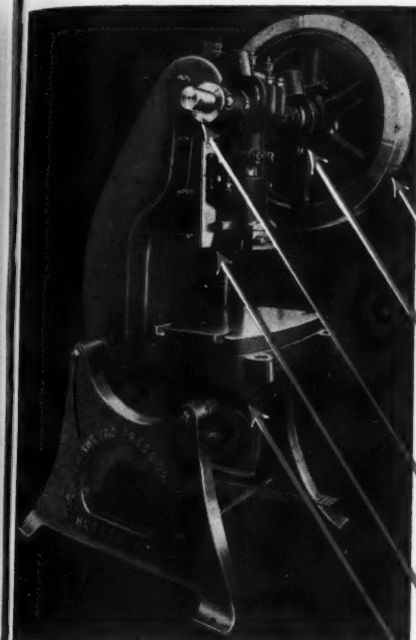
FLYWHEEL—Balanced for smoother operation and maximum power. There is a particular advantage to V&O Presses—when setting the dies the Press can be backed up with the flywheel, without the use of any accessory.

CLUTCH—Working parts are of heat-treated alloy steel. An outstanding feature is the V&O Positive Stop which, if the brake should ever fail, engages the switch plate with the shaft, preventing the press from "repeating".

SHAFT—Diameters are large. An eccentric type shaft is used for maximum strength.

SLIDE—A conspicuous V&O feature is the length of the slide. On our Inclinales, the slide is almost twice as long as on an ordinary press. The result is greater accuracy of travel and longer life to dies.

BODY—All V&O bodies are provided with overhanging journal bearings of generous length. All excess weight is eliminated—and the scientific distribution of metal, reinforced where necessary, provides unusual sturdiness.



THE V&O Press Company has been building **Adaptability and Versatility** into Presses for forty years. An accumulated wealth of experience in this specialized field provides many unusual Features at a cost slightly higher than an average press. Get in touch with us or our agents before buying your next machine.

The V&O PRESS COMPANY, Hudson, N. Y.

AGENTS:

Henry Prentiss & Co., New York, Hartford, Boston, Syracuse, Buffalo.
 Marshall & Husehart Machinery Co., Chicago, Milwaukee.
 Sterling-French Machinery Co., Detroit.
 George L. Lind, Philadelphia.
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 Arthur Jackson Machine Tool Co., Toronto, Montreal.
 Elliott & Stephens Machinery Co., St. Louis.
 Tidewater Supply Co., Norfolk and Roanoke, Va., Columbia, S. C., Asheville, N. C.
 D. S. Mair Machinery Corp., Houston and Dallas, Texas.
 Joseph F. Pfum Sales Engineering Co., Cincinnati, Ohio.
 The National Machine Tool & Supply Co., Minneapolis, Minn.
 Meyer Machinery Co., Los Angeles, California.



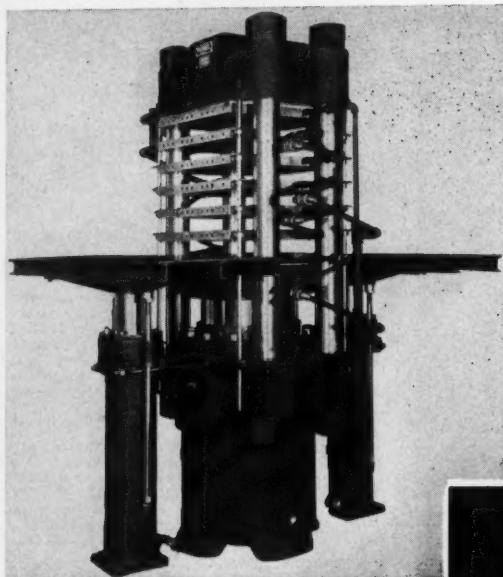


Fig. 5—A six-opening rubber molding press with hydraulic lift tables for facilitating loading and unloading molds from the several platens.

plastic industries are listed in three general classifications, according to the medium used for heating. The more common method is to heat them by steam, brought into the plates through piping and flexible joints. The plates are drilled and plugged in a regular pattern, to provide proper circulation of the steam and heat conduction with a minimum of loss.

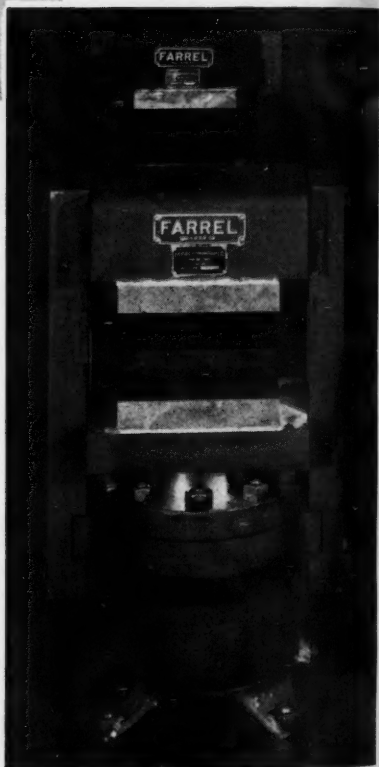
Electric cartridge and strip heater elements are also used and are ideal for laboratory press use. Heater elements, while low in initial cost, are usually expensive to operate. Temperatures should be thermostatically controlled to avoid waste of current.

Gas-heated platens are used on some classes of molded plastic work, particularly small tube and bottle caps and other small pieces that are produced in great quantities, but have fewer applications than either

the steam or electric platens. The heated platens are usually made of rolled steel plate, although Mechanite Metal, a process cast iron, is now coming into use. Great care must be exercised in the machining of plates, both as regards the interior drilling and the machining and polishing of the plate surfaces.

Presses for the plastic industries are usually operated

Fig. 6—A small rubber molding press with steam heated platen. Tension members are rolled steel slabs keyed and bolted to the top and bottom crossheads.





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Teeth like a metal saw make
these new, high-grade files cut
better and last longer.

SIMONDS

SAW AND STEEL COMPANY
Fitchburg Massachusetts

by hydraulic power from an accumulator system, a battery or group of several presses being served by one accumulator. The latest development in the industry, however, is the self-contained press, consisting of a press and pumping system in one self-contained unit. The pump used on this new development is the high pressure rotary radial piston type, of which more will be said later. Oil is the hydraulic medium and the operating pressure on the ram may be controlled at the will of the operator, as dictated by the required pressure at the mold.

In addition to the conventional method of filling the mold with either the granular compound or with pre-formed compound pellets, the injection molding process is fast becoming

Fig. 7—A striking example of modern industrial design. 140-ton Plastic Molding Press with three 60"x30" platens. Self-contained hydraulic power unit mounted on top cross-head. Power plant and piping fully inclosed in welded sheet steel covers.

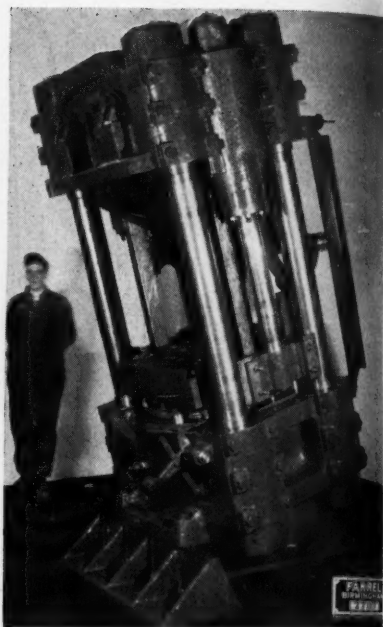
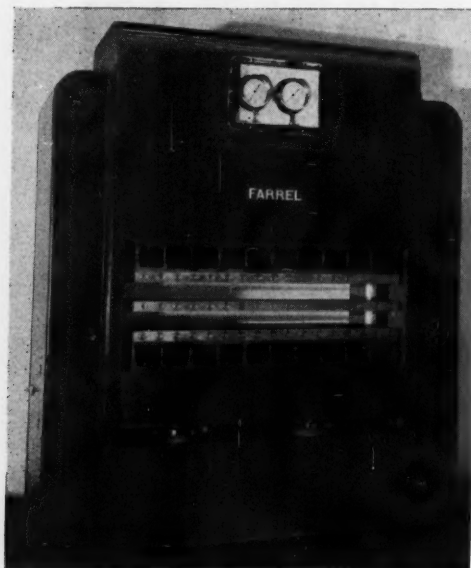


Fig. 8—1000 ton Inclined Hydraulic Molding Press. Molds open automatically, making interior more accessible for filling and for removing the finished parts. This design reduces heavy manual labor usually required for press operation.

popular for certain products.

This injection molding process forces pre-heated thermoplastic compounds into a closed mold. This process is not entirely new, having been in limited use since the 1870's. Recent developments in thermoplastics not supersensitive to heat have given new impetus to this method. New presses had to be developed to utilize these new materials, all of which are of the self-contained power unit type.

The process lends itself well to the use of a horizontal press, with all functions synchronized for accurate operation. On one

THE RIGHT TOOL FOR EVERY JOB

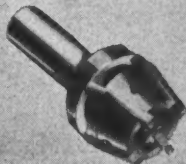


THE RIGHT TOOL at the production end of the machine is an important item in the set-up, for production is hampered unless the cutting tools are fully equal in design and quality to the fast, powerful machines on which they are used.

Order from Stock—You're Sure of the Best

MATERIALS—WORKMANSHIP—DESIGN are all combined in Gairing Cutting Tools to meet the requirements of modern high speed production. The standard Gairing line is comprehensive and contains the most complete line of standard modern end cutting tools available.

SEND FOR CATALOG of the Gairing line on your company letterhead — put your special problems up to us. A Gairing representative is near to serve you.



THE GAIRING TOOL CO.

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of the recent developments of this type of press, up to 400 "shots" per hour can be made, giving a production of 500 cubic inches per hour of molded parts. Hydraulic pressure on the molding material is readily adjusted from 2,000 to 10,000 lbs. per sq. in. The die plates are 18 by 20 in. and the die opening is 8 in. The hydraulic

equipment includes two independently regulated radial piston pumps, using oil as the hydraulic medium.

Granular material is fed from a hopper which is directly connected with the heating chamber. A reciprocating plunger forces the material through the heating chamber, where it is brought to the required plasticity. The plastic is then subjected to a high pressure for extrusion into the mold. The two halves of the mold are carried on platens, one of which is movable for closing and opening the mold. The inner platen has a floating action for bringing the mold inlet in contact with the extrusion nozzle. Both halves of the mold are chambered for circulation of cold water to chill the plastic after the cavities are filled. Molded parts are ejected automatically.

It is quite probable that a long time will elapse before the adoption of the self-contained unit press becomes common in the plastics indus-

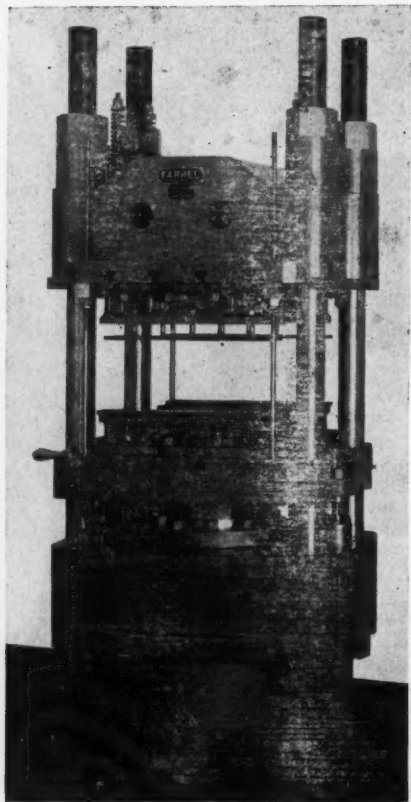
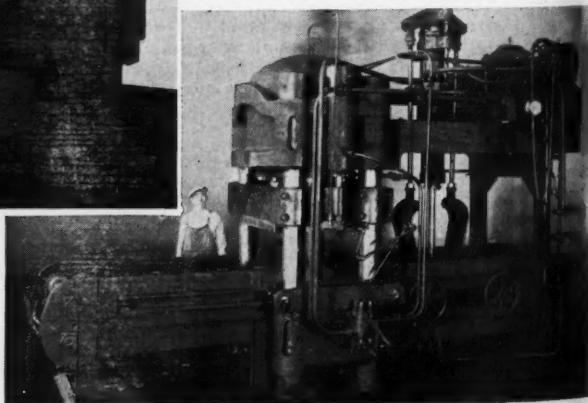


Fig. 9—(Above) — A Plastic Molding Press equipped with knockout for clearing the molded parts from the mold.

Fig. 10—A combination production machine consisting of a 1000-ton hydraulic press with steam plates, a conveyor and hydraulically operated stripping and knockout cylinders. Hydraulic power supplied by radial piston pump mounted on top of machine. This unit combines the functions of four different machines previously used on the process.



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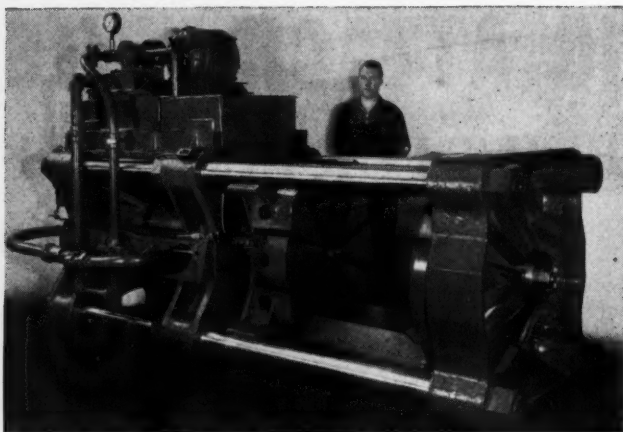


Fig. 11—This bale cutter is a variation of the hydraulic press set in a horizontal position and used for cutting bales of rubber into small pieces.

tries, because an accumulator system, properly designed, installed and maintained, is the most economical installation when there are a number of presses in operation. Usually there is not the necessity for high speed operation as we know it in the metal-working industries, as the molding time or curing time is governed by certain thermo-chemical considerations that are not present in metal-working. The control of the press can, therefore, be a simple system and, with the exception of timing devices for timing the cure, no electric apparatus is needed at the press.

In this same general classification of hydraulic presses, we find the larger presses for vulcanizing rubber floor tiling, matting, sheet packing and other materials that are cured under heat and pressure. These have been built

each comprising this particular tiling press with an equalizing device to insure parallel movement of the platens throughout the stroke, thus minimizing wear on all parts of the press. The steam plates are drilled in separate sections to insure uniform heat-

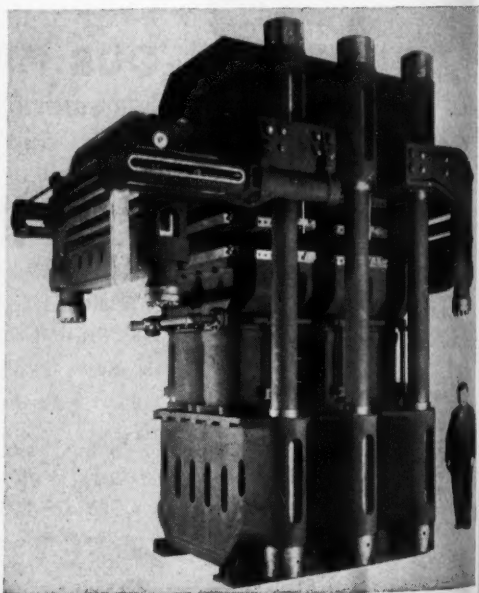


Fig. 12—A large press of 2000 tons capacity for curing endless rubber belts, printers' blankets and similar rubber goods. Equipped with hydraulic stretcher and clamp for stretching the material under cure.

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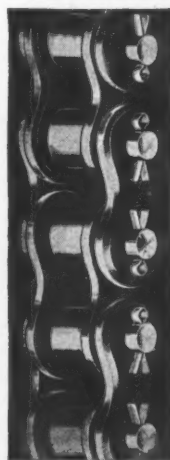


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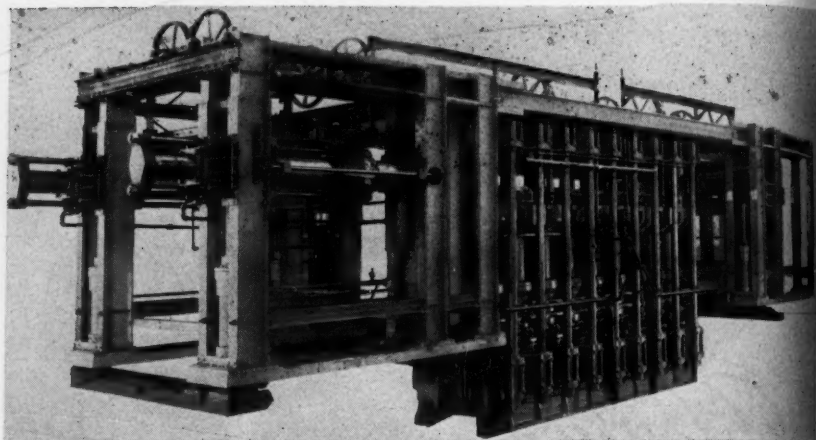


Fig. 13—A hydraulic press used in Australia for vulcanizing heavy conveyor belts. Equipped with press equalizers and special hydraulic stretcher and clamps. Platens are 63" wide by 20' 6" long.

ing of the whole plate, which is made in one piece.

Belt presses are used for vulcanizing rubber belting and must be equipped with hydraulic stretchers and clamps for holding the belt under

tension while it is being vulcanized.

The uses to which hydraulic presses are put in the industries that compress, vulcanize or cure their materials are almost without number, and occasionally a new and interest-

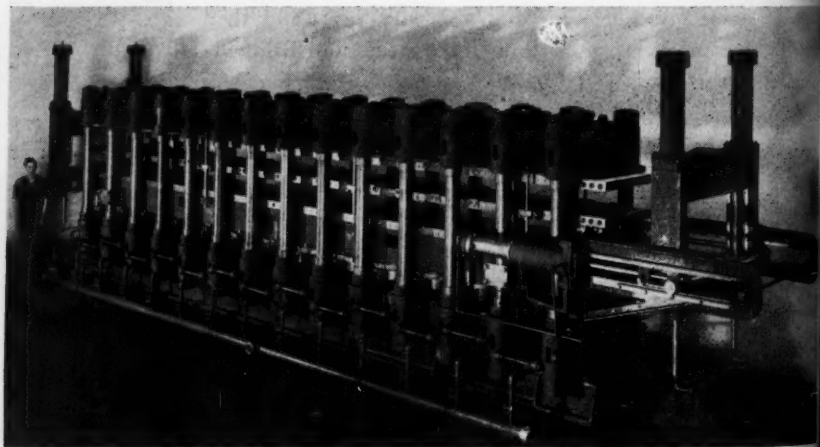


Fig. 14—A hydraulic belt press with three platens 35" wide by 31' 6" long. Equipped with hydraulic stretcher and clamp. New design features improve precision and increase output.

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ing use is made of hydraulic pressure. For instance, a large press has recently been put into service for pressing the sole leather used in the manufacture of shoes. A pressure of 8,000 lb. per sq. in. over the area of the leather is exerted by this 3,600-

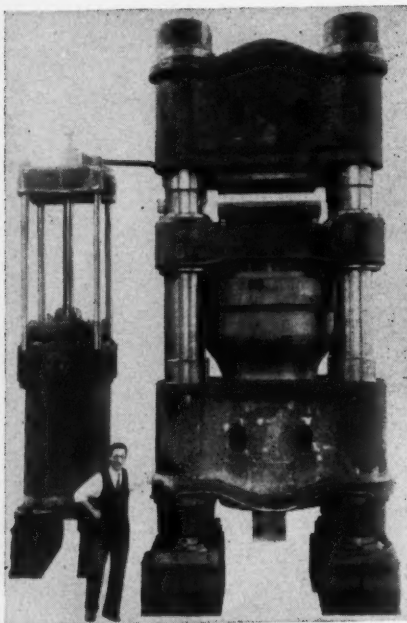


Fig. 15—3,600-ton Hydraulic Press for pressing sole leather. The hydraulic intensifier shown at left takes water from a multi-stage centrifugal pump at 250 pounds per square inch and through a suitable proportioning of cylinder and plunger areas deliver it to the press at a pressure of 7500 pounds per square inch.

ton capacity press, which has a 36-in. diameter ram but only an 8-in. stroke. The maximum hydraulic pressure is 8,000 lb. per sq. in. and is developed by a multi-stage centrifugal pump, acting through an intensifier developing 7,500 lb. per sq. in. The speed of the press is three strokes per minute, 24 hours a day.

In passing, it might be interesting

to look into the customer's reasons for buying this large press. First, the quality of the leather is improved by compressing the fibres, improving the wearing and water-resisting qualities. Second, the enormous pressure of 4 tons per sq. in. removes much of the objectionable unevenness of the leather. Third, this leather being absolutely flat, is worth from 3 to 10 per cent more to a shoe manufacturer, because he can get more soles from a perfectly flat piece of leather than he can from a piece that is not flat. And we see progress in an industry due to the perfection of a special piece of manufacturing equipment, quite far removed from the actual process of shoe manufacture.

Summarizing the features of the hydraulic presses in common use in the plastic industries, we find that they are simple in mechanical design of their component parts and that their control systems are usually free from the relatively complicated combinations sometimes used on presses in the metal working industries. Time is the important factor in high rate production in the metal working industries of today, and this necessitates automatic or semi-automatic systems for the control of hydraulic presses, for which there is comparatively little need in the industries requiring a time period for curing or vulcanizing processes.

ARMCO GALVANIZED PAINTGRIP SHEETS. A folder describing the advantages of Armco Galvanized Paintgrip Sheets has just been issued by The American Rolling Mill Company of Middletown, Ohio, under P. O. 73. Paintgrip is a new Armco galvanized sheet metal that is readily paintable without special acid treatments or weathering.

Forming qualities, soldering practice, welding, cleaning and finishing operations are described in the folder. Paintgrip is available in base metals of Armco Ingot Iron, copper-bearing steel or plain steel. Copy free upon request.

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Finishing Cemented Carbides

BY HENRY R. POWER

The Carborundum Company, Niagara Falls, N. Y.

SURFACES that have been hard-finished with materials like "Haynes Stellite" can be finished by the use of aluminum oxide wheels, of either the regular or the white variety, depending on whether the grinding is to be internal, external, or on the surface. In the case of cemented carbides, such as tungsten carbide, tantalum carbide, or titanium carbide, of which the chief characteristic is their hardness, the use of an aluminum oxide wheel is out of the question. This fact is immediately apparent when it is considered that the Brinell hardness of the carbides runs from 1800 to 2400, compared to approximately 800 for hard tool steels.

In order to grind the surface of a section of carbide, the wheel must be sharp, and it must also be free and cool if efficiency is any object. At best, wheel wear will be somewhat higher than that which occurs when grinding ordinary steels.

One of the requisites of success in the use of a carbide as tool material is a clean, sharp edge. Inasmuch as the material is somewhat more brittle than the steels, this factor becomes important when sharpening the tool, due to the tendency of the edge to chip as shown in the photomicrograph Fig. 1.

To avoid chipping, the grinding wheel must cut extremely free, it must run true and without chatter or vibration, and the grit and grade or degree of hardness of the wheel structure must be correct. With the grinding machine equipment in good condition, correct grinding wheels,

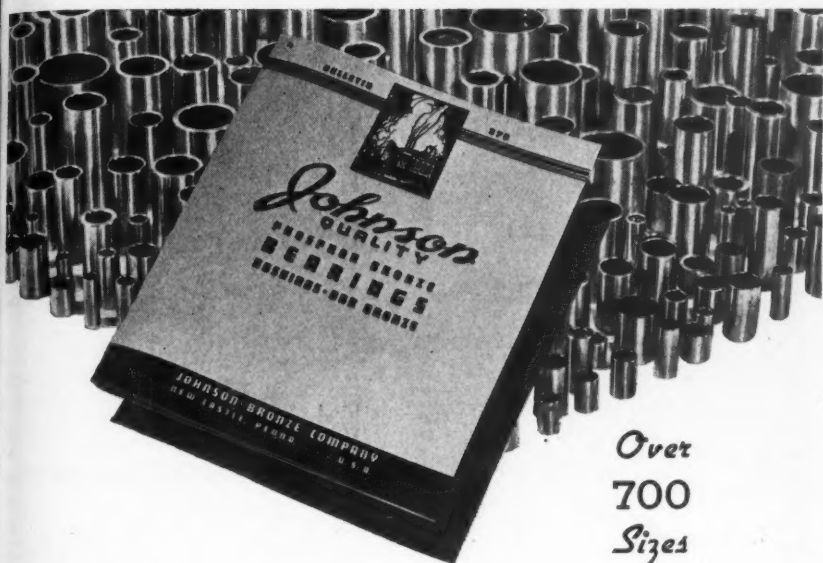
and an understanding of the proper technique of grinding, the cost of grinding carbides should be but little higher than the cost of grinding high speed steel.

Due to the extreme hardness and comparative brittleness of the carbides and the necessity of producing a smooth, sharp cutting edge, special grinding wheels have been developed to meet the needs of the industry. These grinding wheels are known as "Green-Grit" wheels and are, as the name implies, green in color. They are made from a special silicon carbide that is hard, sharp, and somewhat friable.

The bonding is such that an open, porous wheel structure results. This combination of a special abrasive and the open bonding produces a wheel that is remarkable for its cool cutting qualities and its unusually long life. The Green-Grit wheel cuts tungsten carbide with comparative ease; it is necessary only to find the correct grit and grade of wheel for any particular operation in order to obtain good results.

In grinding cemented carbides, the following precautions should be observed:

1. Grinding wheel speeds should be low rather than high, in order to avoid heating and checking the work. Speeds of from 4,000 to 4,500 s.f.p.m. are recommended.
2. The grinding wheel should run perfectly true to avoid chipping the cutting edge.
3. The direction of rotation of the wheel should be such that the wheel



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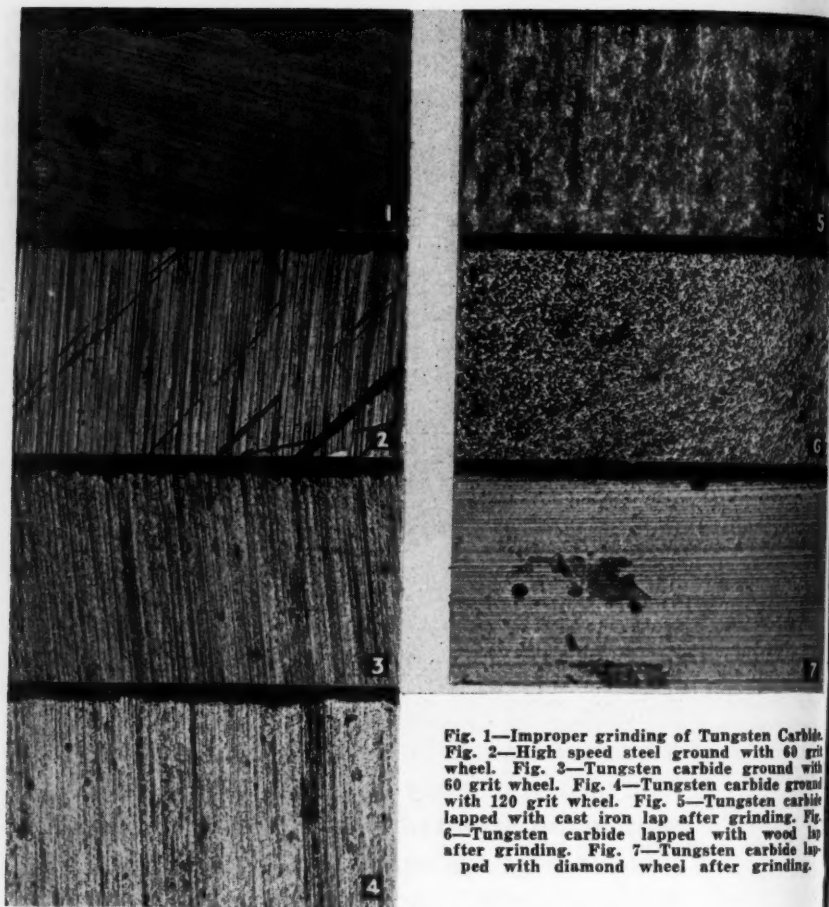


Fig. 1—Improper grinding of Tungsten Carbide. Fig. 2—High speed steel ground with 60 grit wheel. Fig. 3—Tungsten carbide ground with 60 grit wheel. Fig. 4—Tungsten carbide ground with 120 grit wheel. Fig. 5—Tungsten carbide lapped with cast iron lap after grinding. Fig. 6—Tungsten carbide lapped with wood lap after grinding. Fig. 7—Tungsten carbide lapped with diamond wheel after grinding.

first comes in contact with the tool at the cutting edge. This precaution will also preclude the possibility of chipping.

4. The pressure of the tool against the wheel should be light to avoid excess heating and rapid wheel wear.

5. If water is used, the supply should be plentiful and the supply directed at the point of contact between the wheel and the work.

For rough grinding, it has been customary to use wheels of 60 and 80

grit, and for finish grinding, 100 and 120 grit.

The practice followed in some tool-rooms is to use a green-grit grinding wheel, followed by lapping, where a dead smooth finish is required from the tool. The lapping is done with 220 grit silicon carbide or RS9 lapping compound. The latter is a fine-grit silicon carbide dispersed in a special medium which is particularly adapted for holding the grip to the surface without scratching. Wood laps pro-

Material
Size of
Depth

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duce a semi-polished finish, as compared with the dull mat produced by an iron disc.

Practice in other toolrooms calls for a green-grit vitrified silicon carbide followed by a diamond grit wheel for finishing. This wheel is made of selected quality diamonds, crushed and graded to size and bonded with a resinoid bond. Its use results in a superior quality of cutting edge on the cemented carbide tool, increased tool life, a saving in labor hours in the conditioning of tools, and reduced maintenance costs on machine tools and spindles.

The proper use of a diamond grinding wheel results in a total absence of chipped edges on the cemented carbide tool. It produces the required edge, therefore, with less waste of the tool, hence is an economy. The tool with the superior edge requires less frequent reconditioning, thus producing more pieces per grind, which results in a saving of productive time. The tool can be used down to a thinner section, due to the fact that the tool can be ground on the diamond wheel with less pressure. Less pressure results in less heat, eliminating danger of cracking and chipping. Inasmuch as the diamond wheel cuts 13 times faster than a vitrified wheel on pure tungsten carbide and four to five times faster on mixed metals, the use of such a wheel often results in a saving of time which will offset the higher cost of the diamond wheel.

In general, diamond grinding wheels should be used wet when grinding cemented carbides. Light machine oils and cutting oils retard the cut to some extent, and greater heat is generated than when clear water is used. Dry grinding shortens the life of the wheel and may generate localized heat, which will damage the tool.

For the sake of economy, also, the

diamond wheel should be used on carbides only, and not steel. The wheel should be in running truth, with no excessive infeeds, and the wheel speed should be at least 5,000 s.f.p.m. For rough grinding, the green-grit vitrified wheel should be used so that the diamond wheel can be conserved for finishing.

Fairbanks-Morse Bulletin 3600-AI. In this bulletin Fairbanks-Morse & Co., 902 S. Wabash Ave., Chicago, Ill., describes the construction and applications of its Model 36 Diesel Power Units. The Model 36 Diesel offered in two cylinder sizes and in various combinations, with rating as low as ten horsepower, is the smallest in the complete line of Fairbanks-Morse Diesels.

It is available as a completely enclosed power unit, mounted on skids and with radiator, hood and fuel tank for exposed installations; mounted on a cast-iron base with or without clutch and reduction gears for stationary use; and as a basic power unit for installation in portable or semi-mobile industrial and construction equipment.

The F-M Model 36 is a medium high speed, four-cycle Diesel in which are embodied those refinements that are a result of forty years experience in the production of internal combustion engines. A study of the many sectional views and illustrations of parts contained in the bulletin shows that this engine has been developed by designers well versed in the requirements of heavy duty industrial service. Design has not been subordinated to manufacturing convenience. It is an engine of extreme simplicity and neat appearance, compact and completely self-contained, economical and absolutely dependable in operation.

Bull Dog Grip Borolon Polishing Grain is the title of a folder dealing with the preparation and uses of Borolon polishing grains. The folder is being issued by Abrasive Company, Tacony & Fraley Sts., Philadelphia, Pa.

The text discusses the composition of Borolon, manufacturing processes, down to the final packing and shipment of this abrasive. Instructions are given for setting up polishing wheels with Borolon polishing grains to obtain the best results. Copy free to machine shop executives.

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Fitting Punches and Dies by Rotary Filing

By A. G. SCHAAD

President, Rotary File Company, Detroit, Michigan

RECENT trends in the manufacturing of commodities of all kinds have been toward the use of metals, particularly of the sheet type. Office desks, tables, lockers, partitions, and other equipment are formed from sheet steel; automobile bodies are made of sheet steel; store fronts are fabricated from these same steel sheets, and everywhere other, less stable materials are giving way to this convenient, wear-resistant material.

There are a number of good reasons for this change. Among these is the steady depletion of our forests, which is reflected in the steady increase in the cost of wood products. Another is the comparative ease with which steel is processed, especially in the sheet form. Another — and a most important one — is the long life of steel products and equipment in comparison with wood and other of the softer materials. It is a well-known fact that steel equipment will withstand abuses which would soon wreck equipment made from the less impregnable materials.

Sheet metal parts are produced at a high rate of speed after the tools have been made, but the manufacture of the tools is often a somewhat complicated and costly process. The making of a die is pretty much a job of hand work, requiring the skill of a highly-trained artisan, and the utmost care is usually required in the fitting of the parts and in finishing the die, so that the utmost in accuracy and

die-life may be obtained.

Not all of the job is slow and tedious; once a die-plate has been laid out, the stock can be roughed off by machine with the usual machine rapidity. Where contours are irregular, however, — and most of them are — the last thousandth or so is usually taken off by hand work, and there is no question but that the last thousandth is the most expensive one.

To reduce the time and cost on the finishing of dies and similar tools, a number of methods involving the mechanical operation of a file have been developed, among them the rotary filing method. A high speed bench drill press or similar machine is used, the file being held in the chuck so that it can be revolved at high speeds while the work is guided against the revolving file by hand. The advantages consist in the fast cutting action of the file and the fact that the work can be accurately guided when both hands can be used and the operator's attention can be focused on the task. A third advantage is, of course, that the finished surface will be flat instead of uneven, as is usually the case when it is hand-filed.

In finishing a punch to a layout line or other surface marking, the punch is held in contact with the revolving file until the excess stock has been removed, then the punch and die are placed in position in a press and the punch is sheared in the hardened die for a distance of perhaps $\frac{1}{8}$ in.

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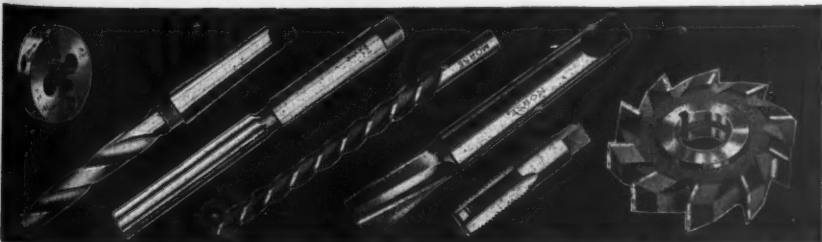
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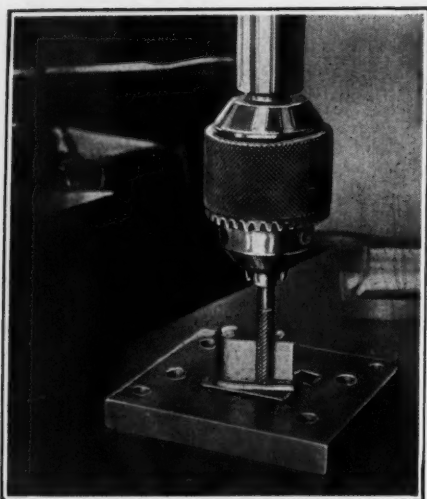


Fig. 1—Rotary Filing a Punch with a Straight Rotary File Prior to Shearing.

The punch is then colored with Prussian blue or copper-plated by the use of blue vitriol and the remaining stock is filed off, this operation progressing until the mark of the file can be seen on the sheared portion. If the punch is to be used for shaving, no other filing is necessary except, possibly, for smoothing the file marks.

If the punch is to have a definite amount of break-clearance in the die, the amount required should be determined from tables which will be found in most engineering handbooks. For example, however, let us assume that a punch is to have a clearance of 0.005 in. on one side, for which a break-clearance file with a shank 0.010 in. smaller in diameter than the cutting diameter is selected. The punch should be rotary-filed and sheared-in as explained in the previous paragraph.

The cylindrical file is now replaced by the break-clearance file, which is set for height so that the shank will come into contact with the sheared

portion, thereby acting as a stop and guide for profiling around the sheared end of the punch. With its larger cutting diameter, the break-clearance file will finish the punch to the exact contour of the sheared portion with the exception of a 0.005 in. step, which is the clearance desired. The punch is now blued or coppered as explained above and the clearance file is replaced with a straight one, after which the step left on the sheared portion is filed down until the file just touches the undercut portion. This method will produce an accurate break-clearance and will eliminate tedious grinding or stoning of the punch after it has been hardened.

Rotary files are also successfully used for filing dies, particularly in narrow slots where filing machine files are difficult to hold rigidly.

A few words about the proper speed of rotary files may not be amiss here. The surface speed of a rotary file should be the same as that for

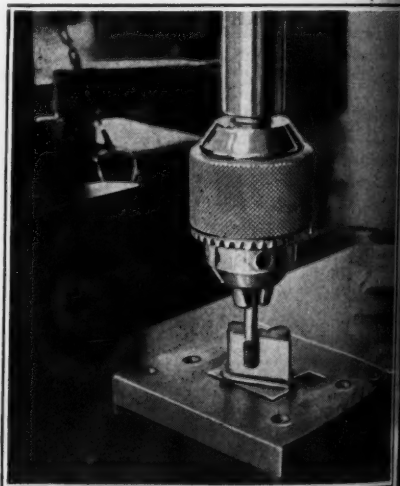


Fig. 2—Rotary Filing a Punch with a Break-Clearance Rotary File. The Shank Acts as a Guide for Profiling Against the Sheared Portion of the Punch.

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milling cutters used in finishing operations. Surface speeds of 80 ft. per min. for hard alloy tool steels to

or special rotary file steel. In the larger diameters the nearest and slightly higher speeds are shown as

Safe Speeds for High Speed Steel Rotary Files. (R.P.M.)

File Dia.	Alloy Tool Steel	Carbon Tool Steel	Mild Steel	Cast Iron	Brass	Aluminum
1"	5000	6400	7500	4800	12000	16000
1 1/8"	2500	3200	3750	2400	6000	8000
1 1/4"	1670	2150	2500	1600	4000	5400
1 1/2"	1250	1600	1875	1200	3000	4000
1 3/4"	1000	1300	1500	950	2400	3200
2"	835	1100	1250	800	2000	2700
2 1/8"	720	920	1075	690	1900	2300
2 1/4"	625	800	1030	600	1500	2000
2 1/2"	500	650	750	480	1200	1600
2 3/4"	420	550	625	400	1000	1400
3"	360	475	550	350	950	1200
3 1/2"	320	450	500	250	750	1000

250 ft. for aluminum are recommended. The table below is based on these figures and speeds are calculated for rotary files of various diameters and made of high speed steel

the file-teeth are usually coarser than those in files of the smaller diameters. The speeds listed can be exceeded, but the life of the rotary file will necessarily be shortened in proportion.

Carboloy Grinding Chart. Carboloy Company, Inc., Detroit, Michigan, manufacturers of cemented carbide tools, dies and wheel dressers announces the publication of a new grinding chart No GC-71.

This 18x12-in. wall chart presents, in condensed form, the most efficient methods for grinding single point Carboloy tools. It contains recommendations on grinding wheels, diamond wheels, diamond lapping discs, wheel speeds, rough and finish grinding procedure, and methods for hogging off stock rapidly. This chart supplements the demonstrations given throughout the country by Carboloy Company during 1936 on the latest, most economical, rapid grinding technique. Copies of this chart, No. GC-71, may be obtained by writing Carboloy Company, Inc., 2975 East Jefferson Avenue, Detroit, Michigan.

Tag Laboratory Thermometer and Hydrometer Catalog No. 1100A. The C. J. Tagliabue Mfg. Co., Park & Nostrand Aves., Brooklyn, N. Y., announces the publication of a new TAG Laboratory Thermometer and Hydrometer catalog, No. 1100A.

In addition to the regular line of extreme precision and standard grade TAG Thermometers and Hydrometers, this

valuable, new catalog now includes complete listings of the widely used A.S.T.M. Thermometers with illustrations, also the well known TAG-A.P.I. and TAG Certified hydrometers.

Useful data including comparison scale graduations, corrections for emergent stems, instructions for using hydrometers and Fahrenheit and centigrade conversion tables are retained and amplified.

A catalog will be sent free by the manufacturer on request.

P&H Holsts, Bulletin No. H-5. The Harnischfeger Corporation, 4535 W. National Ave., Milwaukee, Wis., has just issued a bulletin entitled "P&H Holsts". The bulletin is profusely illustrated with more than 25 industrial application photographs, which describe the added advantage in handling "off-the-floor". It contains the treatment of both general and specific problems in the industrial handling field as well as many diagrams which explain simplified construction and operation in modern holst design. The bulletin lists the ratings and operating ranges for holsts from the 100-lb. capacity to the 15-ton capacity, as well as specifications and electrical accessories. Copy free upon request.

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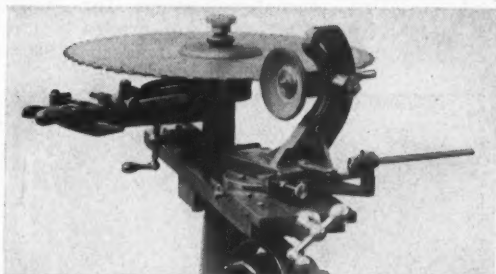
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*This looks like a "tough"
power drive problem!*

What makes it tough is that the grinding wheel of this machine must be adjustable in three directions: up and down, in and out and in a horizontal arc.



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S. S. WHITE FLEXIBLE SHAFT

a single self-contained unit, easily applied, efficient and reliable. Remember the flexible shaft when you have a drive problem of this character.—And let us help you work it out—we'll be glad to do so without obligation—Just send us the details.

No. 12 Universal Saw Sharpening Machine, product of the Cochrane - Bly Co., Rochester, N. Y.



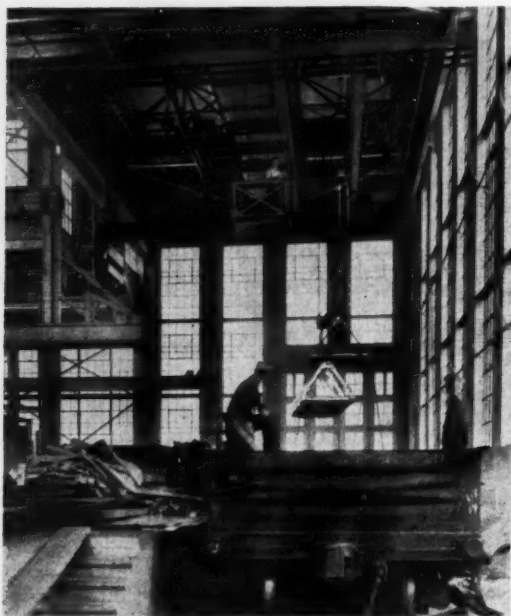
The S. S. WHITE
Dental Mfg. Co.
**INDUSTRIAL
DIVISION**

10 East 40th St., Room 2310S
New York, N. Y.

Modern Equipment at Work

Novel Transfer System for Overhead Cranes

A NOVEL transfer system for moving loaded overhead cranes from one bay to another has recently



The transfer crane picks up the main bay crane with its load and transfers it to another bay.

been installed in the new Detroit Plant of the American Blower Corporation. This installation consists of four units—two of which are standard overhead travelers moving up and down the working bays, while the other two are transfers which travel at right angles along both ends of the building. Through ingenious arrangement, heavy machin-

ery units in the process of fabrication in the main working bays are lifted by the overhead cranes and carried by them to the end of the runway where the entire cranes with their loads are picked up by the transfers traveling at right angles and thus transferred to adjoining bays for the next steps in production.

The transfer cranes, both of 25-ton capacity, run at right angles to the bays at each end of the building. Suspended from the bottom of each is a section of runway, which, when locked into position, serves as a protected track and carrying attachment for the entire bay crane and its load. Moving along the end of the building, the transfer crane can be locked into position at the exact point where the carrier runway is aligned with the main bay runway. With this accomplished, the runway end-stops are raised, permitting the entire crane to move off the transfer runway to the permanent bay runway.

This unique transfer system can easily be applied to as many bays as desired by extending the length of the transfer crane runway. The main bay cranes are 5 and 10-ton capacity units, operating on runways 364 feet long while the transfer cranes travel 120 feet across the ends of the building. To take still further advantage of this novel system, depressed railroad tracks, running below and

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No

April, 1937

As a Grinder for
Mass Production . . .

As a Grinder for
Small Lots . . .

The Norton 6" Type C is Making a Real Record

Users are mighty enthusiastic about the Norton 6" Type C in mass production plants where it grinds day after day on the same job—smoothly, steadily, without fuss or trouble.

They are equally enthusiastic in plants doing miscellaneous work—25 pieces in one lot, 50 in another, sometimes one of a kind. They like its ease of operation, its quick adaptability.

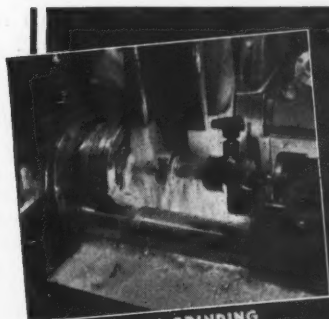
In a large percentage of plants the performance of the first 6" Type C has brought repeat orders because it is fast and dependable—a real money maker.

Available in four standard arrangements including plain and semi-automatic models, hand or hydraulic wheel feed and table traverse.

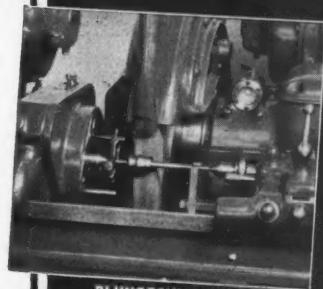
NORTON COMPANY

Worcester, Mass.

New York Chicago Detroit Cleveland
Hartford London



CAM GRINDING
(Distributor Cams)



PLUNGE CUT GRINDING
(Bicycle Hub)



TRAVERSE GRINDING
(Gear Shaft)

GRINDERS

parallel with the transfer crane runways, facilitate the loading and unloading of freight cars.

This unique installation is the result of collaboration between plant engineers of the American Blower Corporation and the consulting engineers, Albert Kahn, Inc., of Detroit, Mich. This crane system was satisfactorily put into successful performance, with interlocking details and wiring circuits to match properly the crane and transfer operations, by the Overhead Crane Division of the Harnischfeger Corporation of Milwaukee.

Disston Files; Their Selection and Care. This title indicates a 12-page catalog insert which gives complete descriptions for the selection of files for all the various kinds and types of operations on which files are used. Beginning with an outline of the operations involved in the manufacture of a file, the text describes and illustrates the standard cuts of regular files and explains the specific uses for which each

cut is intended. A list of file classifications is given with cross-section drawings showing the chips of the files indicated in the list and the specific uses of each type of file are outlined. The section also includes a series of photographs showing the proper manner of filing in a lathe, filing a hand saw, cutting a keyway with a file, draw filing, bench filing with a flat file, and cleaning a file with file card and brush. The section closes with a list of sizes and types of Disston files and rasps. Copy of this catalog section free upon request.

Gem Machine Vises. The Gem No. 4 Square Swivel Base Vise, the Gem No. 5 Plain Vise, Gem All Cast Steel Vise No. 6, Combination Drill Press and Milling Machine Vise No. 7, Gem Drill Press Vise in Nos. 1, 2 and 3, and No. 8 Vise for the Shaper, Planer or Radial Drill are illustrated and described in an eight-page folder which is now being issued by J. E. Martin Tool & Die Works, Springfield, Ohio. Complete descriptions of all the vises are included, with figures giving the width of jaws, depth of jaws, maximum dimensions when open, weight, and so on. Copy of this folder free upon request.



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Knock-Out ball bearing chucks are accurate heavy duty, and practically indestructible. Only a slight fingertip twist is required to hold drills as their action is self-energizing. Releasing drills is almost as effortless. Changing drills becomes a matter of seconds.

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"Masterpak" is an exclusive package development by Abrasive Products, Inc. And its advantages have been among the big reasons for the swing to JEWEL abrasives.

"Masterpak" protects your abrasive order from collision damage at edges and corners. Keeps out moisture and other damaging elements. When you buy JEWEL, you can use all you buy. Abrasive Products, Inc., South Braintree, Massachusetts.

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Ideas from Readers

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . Each one published will be paid for.

Flexible Depth Gage

By DAVID FLIEGELMAN

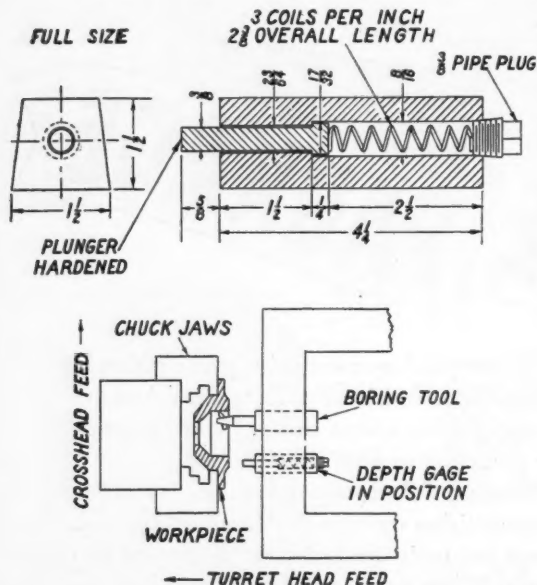
By the use of the flexible depth gage illustrated in the drawing, we have found it possible to combine two originally separated operations

the bottom of the piece. The two operations are now performed with one boring tool, in one operation.

The operation is performed as follows:

As the turret head travels longitudinally, the boring tool enters the work and machines the straight portion of the work-piece. The depth gage is so set that when the boring tool reaches the end of the straight cut the projecting face of the gage-plunger strikes the finished face of the work. The operator at this instant engages the cross feed and as the boring tool continues, it bores the remaining portion of the box at a 45-deg. angle. Since the plunger is backed up by a spring, the plunger is pushed back into the body of the gage as the turret head continues to feed forward.

The drawing also shows the details of construction of the gage. While these dimensions are given, of course, be varied to suit

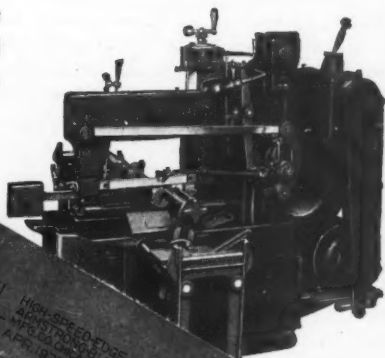


Drawing showing application of flexible depth gage, with details of the gage.

in one, effecting a saving in time and cost. The work-piece is a stuffing box that is used in the assembly of a steam turbine made by the firm with which I am connected, and the two separate operations were (1) boring the inside to a uniform diameter and (2) boring a 45-deg. taper in

the job in hand. In the operation described, the longitudinal and cross feeds are the same, producing a 45-deg. angle. Should a different bevel be required, the cutting angle can be changed to suit by changing the feed ratio between the head and the turret. The surface of the work

the MARVEL all-ball-bearing Automatic Production Sawing machines have created a new standard for practical sawing speeds.



This is the blade that has made modern high speed sawing possible

Because they are strictly high speed (have a cutting edge of 18% Tungsten High Speed Steel) and at the same time are positively unbreakable. MARVEL High-Speed Edge Hack Saw Blades have made heavy duty, high speed, automatic production sawing machines practical.

On any equipment, they permit with safety, higher running speeds and greater feed pressures, and will always assure more cuts per dollar.

MARVEL

High-Speed-Edge
Hack Saw Blades

Write for Circular

Armstrong-Blum Mfg. Co.

"The Hack Saw People"

345 N. Francisco Ave., Chicago, U. S. A.



should, of course, be face-finished before the boring operation is performed, and the gage should be located on the same station as the boring tool.

The use of this gage has been especially advantageous when the number of stations on the turret head is limited. The gage makes possible a reduction in the number of operations and in the number of stations required. The machine used in the instance quoted was a J & L Turret Lathe with cross-feed head.

Combination Rigid and Flexible Tool Holder

By ROGER C. DICKEY

THE tool holder shown in the drawing herewith will be found especially useful on jobs where a rigid holder is needed for roughing

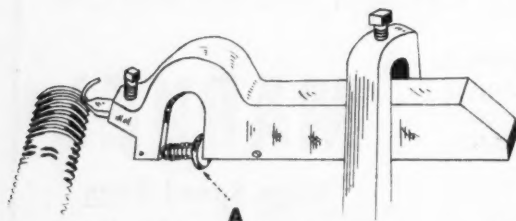


Fig. 1—Combination Rigid and Flexible Tool Holder in Operation.

out the work and a flexible holder is needed for the finishing operation. The holder is designed so that it is an easy matter to convert it from one type to the other.

The tool is designed along the lines of the well-known "goose-neck", the

special feature of this tool consisting in the adjusting screw shown at A in Fig. 1. The screw is made with a large knurled head, so that it can

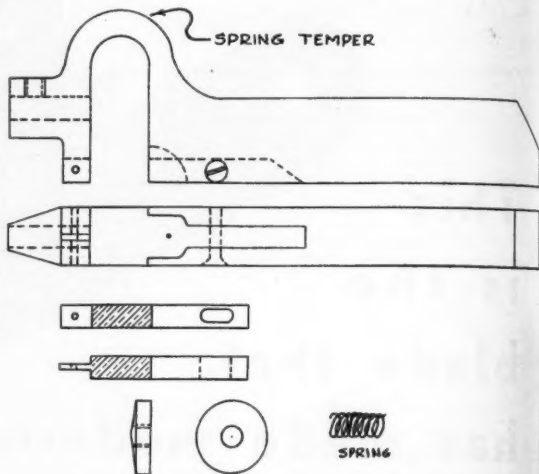


Fig. 2—Details of Combination Tool Holder.

easily be revolved with the fingers, and is threaded into the "head", as shown. By threading the screw back until the head is firmly lodged against the shank of the tool, perfect rigidity is obtained. If any variations in the flexibility of the tool are desired, they can be obtained by adjusting the screw as required. When the maximum of flexibility is desired, the screw is threaded all the way into the head, thus converting the tool into perfect "goose-neck" tool. The adjustments can be made without disturbing the tool set-up.

The tool is easily constructed, and a study of the drawing Fig. 2 will make the details clear. The parts consist of the block, an adjusting bar, threaded into the shank, the adjusting screw, and the spring which

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**"RED CUT SUPERIOR
HAS BEEN MY
CHOICE
for YEARS"**



**"HE HAS ALWAYS
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Yes! . . . the world's finest,
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Superior High Speed Bar Stock

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STEEL COMPANY
LATROBE, PA.

helps to hold the adjusting screw in place.

Machining Tracks for a Rotary Drawbridge


By FRANCIS A. WESTBROOK

THE Barbour Stockwell Company, Cambridge, Mass., takes pride in the fact that its plant is equipped to handle anything from a tachometer to a 24-ton casting, and the more unusual the job is, the better. Among the tasks that were given to this plant recently was that of machining tracks for a rotary drawbridge to be built over the Apponogansett River at Dartmouth, Mass. The track was made in 12 sections, and when assembled formed a circle 23 ft. in diameter. The top of the track, made from a steel casting, was required to be machined with a 13-deg. slant toward the center. The manner in

which the job was handled is illustrated in the drawing.

Three of the plant's planers are set in a row, with the beds running parallel. The planer at one end of the line was selected to serve as the work-table and the machine at the other end of the line was used as the pivot-point for a radial arm to which the toolholder was attached. The beds of both of these planers were locked in stationary position, the center machine being used to impart the necessary movement to the tool.

The radial arm consisted of a section of 8-in. I-beam 12 ft. long, and one end was pinned, by means of a heavy pin, to a heavy steel block which, in turn, was bolted to one of the outside planers as shown at A. To the farther edge of the other outside planer was bolted a pair of sections of 4-in. I-beam as indicated at B. These sections were located one





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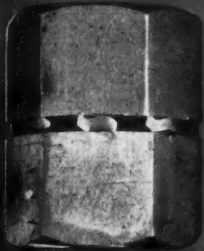
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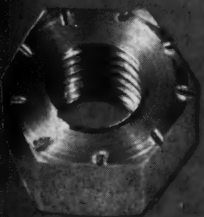
Before setting down
Body of tongue is
horizontal—sharp
edges in contact
with nuts (Unre-
touched)



After setting down
Sharp edges embed-
ded in nuts, body of
tongue flexed, set-
ting up powerful
spring tension
(Unretouched)



Released—tongue
back to horizontal—
definite evidence of
powerful spring ac-
tion (Unretouched)



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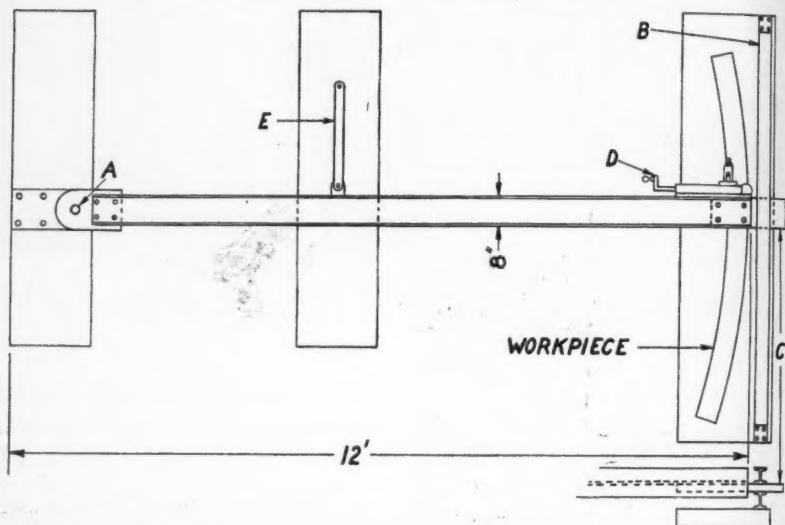
Everlock

The Dual Action
LOCK WASHER

above the other with $1\frac{1}{4}$ -in. spacers between the ends, thus providing a $1\frac{1}{4}$ -in. horizontal slot.

To the end of the radial arm was

and available. However, other means of locating and holding the work and for pinning the radial arm could be devised and thus this type of set-



Drawing illustrating method of machining radius on section of rotary track for a drawbridge.

bolted a 1-in. thick steel plate C faced on both sides with $\frac{1}{4}$ -in. brass, to serve as a pilot for the arm, the plate sliding in the slot provided between the I-beam sections B. To this end of the arm was also attached a toolhead from the crosshead of the planer, indicated at D. With the tool in position to cut, all that was needed was power to swing the radial arm.

The required power was supplied by the middle planer, a link being pinned to the planer-table and, at the opposite end, to the radial arm as shown at E. By reciprocating the planer table, the arm was caused to swing radially and thus the required radius was machined on the track-section. The tool was, of course, fed by hand.

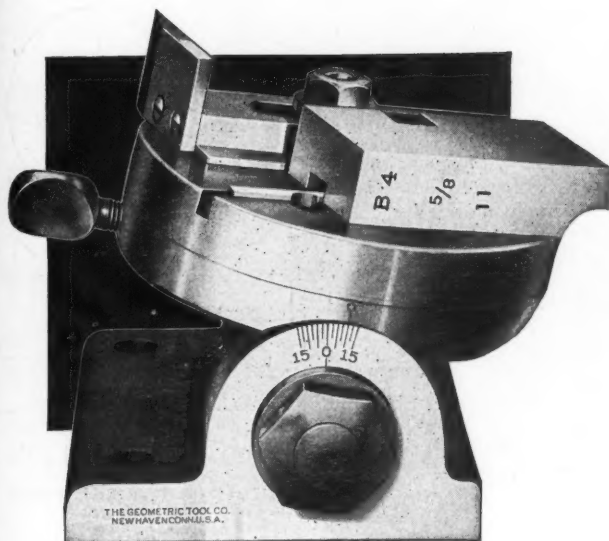
The three planers were used in this case because they were in line

up could be duplicated where a single planer only is available.

Link-Type Reciprocating Cam Slide

BY JOHN A. HONEGGER

IN the design of automatic machinery it sometimes becomes necessary to develop mechanisms that are powered by the main shaft, but which must be designed so that several pulsations can be obtained during a single revolution of the main shaft. For different types of service these pulsations may have to be varied both as to amplitude and the period of time over which these amplitudes are to operate. Such a condition was required in the development of a printing and perforating machine, for which the mechanism shown in the



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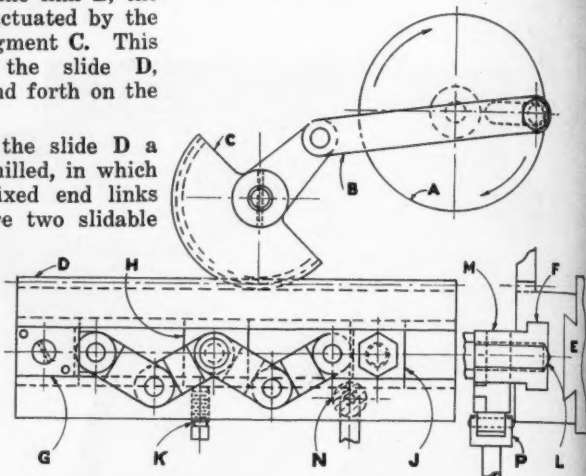
drawing was evolved.

The mechanism consists primarily of the adjustable concentric **A**, to which is connected the link **B**, the link being in turn actuated by the arm of the gear segment **C**. This segment operates the slide **D**, which slides back and forth on the dovetail **E**.

On the front of the slide **D** a T-slot **F** has been milled, in which are anchored the fixed end links **G**. At **H** and **J** are two slidable link holders, by which means the angles of the links are adjusted. Link holder **H** is clamped by means of the cone-pointed screw **K**, and link holder **J** is clamped by means of the ser-screw **L**. The links project out beyond the slide as shown at **M**, and the roll **N**, which actuates the pulsating shaft, is made wide enough to cover the width of the links as shown at **P**.

The operation of the mechanism is self-explanatory. If more pulsations

are desired, links are added and the throw of the slide is increased to accommodate the extra links.



Drawing Showing Design of Link-Type Reciprocating Adjusting Cam Slide

Bond Stock Gear Catalog. The Charles Bond Company, 617 Arch St., Philadelphia, Pa., has just issued a catalog to be designated as No. 58 and which covers Bond stock gears, sprockets, speed reducers, flexible couplings, and industrial equipment. New items have been added to this 176-page catalog and additional sizes of other items are listed. Complete specifications, prices, and directions for ordering from stock are included together with a number of tables and charts containing general gear data. Copy free upon request.

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than their cost in set-up and
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long, they cut into multiples of standard
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Over the Editor's Desk

Business

CAPITAL expenditures totaling \$240,500,000 will be made during 1937 by approximately 160 large concerns in the seventh Federal Reserve District—which is the Chicago district—according to the latest monthly report on business conditions by the Federal Reserve Bank of Chicago. The amount stated will be about one-third more than was spent by these firms in 1936.

About \$83,000,000 will be spent for new machines and other equipment required for plant extension, \$94,500,000 for replacement or repair of obsolete and depreciated machines and equipment, \$13,500,000 for new buildings, \$29,000,000 for alteration, replacement or repair of present structures, and \$20,500,000 is unclassified.

Public utilities and railroads will continue to lead in the expenditures for expansion and replacement programs, but groups processing iron and steel will follow close behind. By groups the estimated 1937 expenditures compare with 1936 expenditures as follows:

Auto accessories, motor vehicles, and aviation (17 concerns), up 29.6 per cent; building materials (9), up 33.3 per cent; machinery, tools, and electrical equipment (21), up 10.2 per cent; railroads (8), up 48 per cent; public utilities (7), up 35.8 per cent; paper and containers (20), up 65.8 per cent. Looks like a good year ahead.

Safety Is Economy

THAT every one of the 120,000,000 people in the United States helps to pay the bill for industrial accidents every time he buys anything, from an automobile to a paper of pins, was the statement made recently by John

E. Long, Superintendent of Safety for The Delaware and Hudson Railroad, in an article in "Executives Service Bulletin."

Mr. Long continued "It is estimated that in 1935 the number of workers who lost their lives in industrial accidents totaled 16,500. In addition, 1,340,000 others suffered injuries sufficiently serious to keep them from work a day or more. It is conservatively estimated that, on an average, the joint compensation and medical bill for each of these injuries amounted to \$200, and it takes only a simple mathematical calculation to arrive at \$271,300,000 as the total direct yearly cost of accidents in American industries.

"If we may add to this figure the indirect costs for hiring and training new men, for damage to machinery and equipment, for slowing up production, and numerous equally costly items which have conservatively been estimated as amounting to four times the direct cost, we reach the staggering figure of more than \$1,000,000,000 as the total annual cost of industrial accidents in the United States."

The above figures are interesting, particularly when it is considered that the steam railroads alone in the United States have reduced accidents to employees more than 75 per cent since 1923. If this 75 per cent is indicative of industry in general, it would seem that our factories and plants fourteen years ago must have been as hazardous as war—and we all know what General Sherman said war is. Today "Work Safely" is the first rule in every factory and shop in the land.

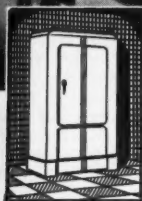
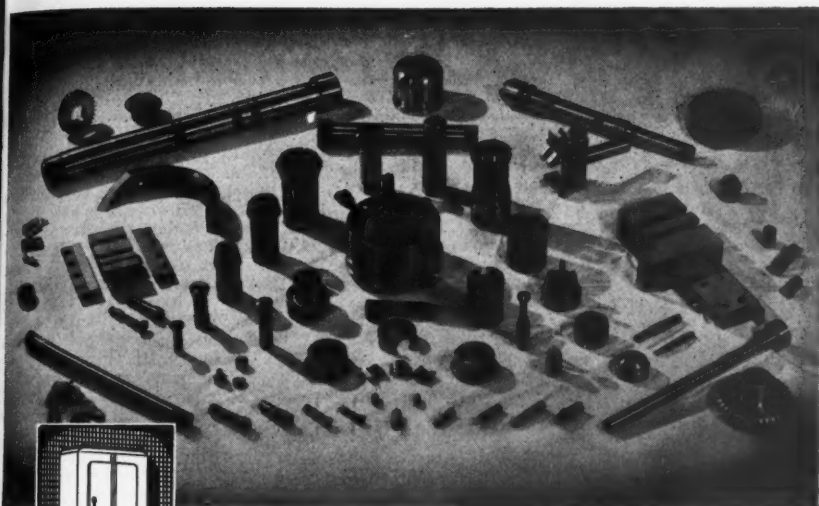
On page 76 of this issue R. A. Shaw, Safety Engineer, The Murray Corporation of America, presents an interesting discussion of modern safety activities as they are carried on in a modern production plant.

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Cold Facts . . .

Tell the Story "MODERN" EFFICIENCY

Modern in design . . . modern in efficiency . . . today's refrigerators stand out as perfect products of a truly progressive industry. Such an industry demands the best in equipment, materials and tools—and screw machine repair parts and tools have never been, and never will be an exception to the rule. Today, MODERN PRODUCTS—supplied both to

refrigerator manufacturers and suppliers—play a part in the production of every refrigerator made in this country. They are meeting every requirement for dependable, efficient operation . . . for long life . . . for economy. Follow the example set by over 1800 concerns operating screw machines. Specify "MODERN PRODUCTS"!

COLLETS with FELT FILLER PADS

Felt filler pads inserted in the slots of MODERN COLLETS eliminate the possibility of oil, dirt or chips being carried inside the spindle. Efficiency of the collet and associated moving parts is improved as no dirt or grit handicaps their operation. There is no possibility of chips or dirt packing around the collet, which often makes removal of the collet difficult when changing jobs. Cutting oil is saved, and there is a decided reduction in the amount of oil ordinarily sprayed to the floor around the machine. Felt filler pads represent only one of the many outstanding advantages offered ONLY with MODERN COLLETS.



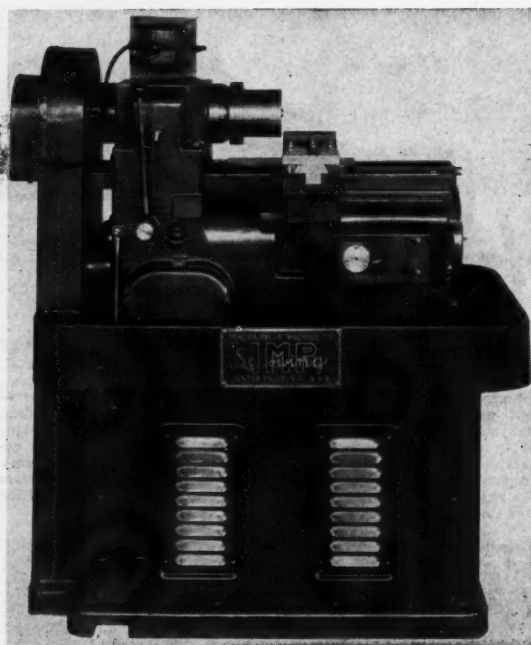
OUR APOLOGIES: Unforeseen circumstances have held up the production of our new catalog. However, IT'S NOW COMPLETE . . . your copy is ready. If you are not among the many whose requests we now have, **WRITE FOR IT TODAY!**

MODERN COLLET & MACHINE COMPANY
401 SALLIOTTE ST. ECORSE, MICH.

New Shop Equipment

Seneca Falls Lo-Swing Imp Lathe

The Seneca Falls Machine Company, Seneca Falls, N. Y., has recently brought out a new model of the Lo-Swing Imp Lathe. The original basic features are the same although there is a modern trend in the lines of the new machine.



Seneca Falls Lo-Swing Imp Lathe

The new model is a compact, rigid machine capable of making high cuts and high speeds. Added features are said to permit greater flexibility and economy in tooling, and provide a design engineered to take full advantage of, and provide best possible results from cemented carbide tools.

The Imp is intended primarily to handle work which requires high speed and accuracy. These characteristics make it suitable for turning heavy work,

such as small pistons, bushings, gear blanks, and so on.

An extremely long bearing on the carriage is permitted through the unique headstock design which permits the carriage slide to pass under it. The carriage is mounted on a flat and V-way. Longitudinal movements are obtained

by a drum cam. An end cover plate facilitates the quick removal of this cam and permits timing the machine for automatic stopping and easy adjustment of the cams for carriage cross feeds, when used.

Feeds from 0.0005 in. to 0.050 in. per revolution are obtained by means of pick-off gears. The finer feeds are used for diamond turning. Easy to remove panels are provided in the motor base. The main motor drive is mounted on a motor plate in the base as is also the coolant pump, main clutch, and brake. The spindle drive is by means of a V-belt or chain. The main parts of the machine are lubricated by means of a pump mounted in the bed which supplies lubricant to all important bearings including the carriage ways. All shafts are mounted on anti-friction bearings.

The spindle is mounted on precision pre-loaded ball bearings and is so constructed that spindle speeds up to 5000 r.p.m. can be maintained. An automatic stop is provided for stop-

ping the machine at the end of its cycle and in addition, a hand lever is provided by which the machine can be stopped anywhere within the cycle. This lever either starts or stops the motor or operates a clutch and brake, depending upon how the machine is equipped.

Although the machine illustrated is equipped with a magnetic chuck for facing disks, the Imp may also be equipped with a tailstock for between-center work. The tailstock can be pro-

vided for lever or air operation and also with a quill carrying a built-in revolving tall center if desired. The Lo-Swing Imp weighs approximately 2000 lbs., swings 9 1/4 in. over the carriage, and 4 in. over the cross slide, and takes 8 in. between centers.

Reed-Prentice No. 10 Automatic Hydraulic Plastic Injection Molding Machine

The Reed-Prentice Corporation, Worcester, Mass., has brought out an Auto-

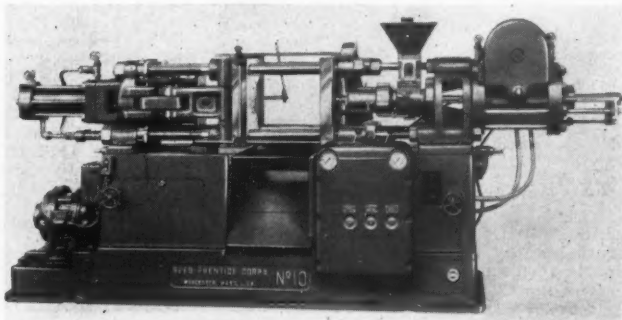
matic Hydraulic Plastic Injection Molding Machine to be known as the "Model No. 10." The machine is equipped with a 5 h.p. 1200 r.p.m. motor and control for the hydraulic pump is mounted outside the cabinet of the machine, thereby permitting the use of a standard open-type ball bearing motor instead of a fan-cooled ball bearing motor.

The timing control consists of three timing units adjustable from 1 to 120 seconds. One timing unit determines the time the pressure stays on the plunger; one determines the period for the solidification of the material, and one determines the time the molds are open for the ejection of the product. When the machine is manually operated, it is controlled by two levers, one for closing the mold, and other for operating the injection cylinder.

The entire toggle end of the machine is adjustable through a screw adjust-

ment which permits more accurate and speedy set-up of molds and adjustment for variation in mold thickness.

The entire injection cylinder end of the machine is adjustable through an adjustment which permits speedy dismantling and change of heating unit or cleaning as well as quick and accurate positioning of a nozzle. An electric heating unit includes a rheostat for heating of the material and provision is made for a thermometer or thermocouple for accurate temperature control of the material.



Reed-Prentice No. 10 Automatic Hydraulic Plastic Injection Molding Machine

Die plates can be supplied to accommodate the customer's molds and the distance between die plates can be increased to 24 in. if desired. A safety device and automatic knock-out for the product is provided.

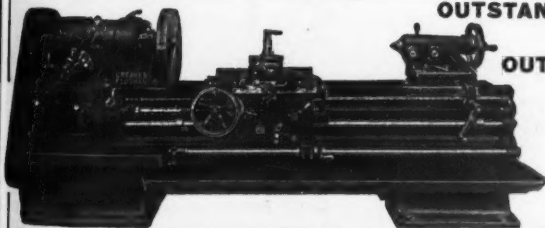
No. 2 1/2 Producto-Matic Milling Machine

A No. 2 1/2 Producto-Matic Milling Machine which is tooled for performing a milling and cutting-off operation from

OUTSTANDING PERFORMANCE provided by

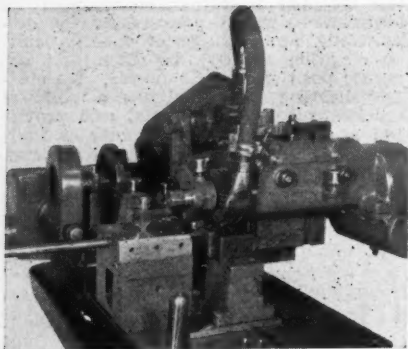
OUTSTANDING FEATURES

G. K. Single Lever Control Lathes will give you the production efficiency you want on your lathe work. Write for catalog describing complete details.



THE GREAVES-KLUSMAN TOOL CO., Cincinnati, O.

bar stock has been brought out by The Producto Machine Company, Bridgeport, Conn. This is a full automatic ma-



No. 2 1/2 Producto-Matic Milling Machine

chine which feeds the material into the work-holding jaws by means of an automatic feeding device.

The material can be of round, square, hex or any extruded formed shape, with-

in a 4-in. square. The machine is motorized with a 2 h.p. motor. A gear box on the end of the machine is provided with pick-off gears for changes of feeds and speeds. The machine is cam operated, thus providing full automatic operation of the machine without any attention on the part of the operator.

Four cams are used, one for horizontal and one for vertical travel of cutters, and one for opening and closing work-holding jaws and one for the feeding device. The work-holding jaws can be constructed to accommodate various types of bar stock. One part of the jaw is solid and the other part is movable so that work can be ejected easily. The jaws are also constructed so that pieces after cut-off do not jam in the jaw or between cutters.

The work shown in the illustration is cold rolled steel bar stock, 3/16 in. in diameter, 9/16 in. in length after cut-off, and a section milled out 3/8 in. long. Production on this machine is 200 pieces per hour.

Porter-Cable "Take-About" Sander

A balanced, portable sander using a 4-in.x 27-in. abrasive belt has been

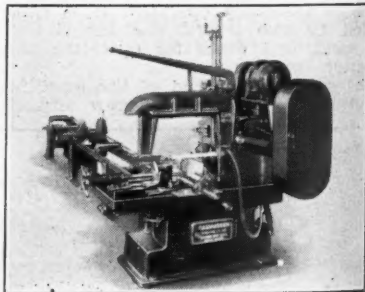
THE NEWEST DEVELOPMENT IN METAL CUTTING MACHINES FULL AUTOMATIC — CAPACITY 10"x10"

Stops when desired number of pieces have been cut. Length of cut is gauged by scale without end stop. Swivels on base for angular cutting.

Also built for manual operation.

RASMUSSEN MACHINE CO.

RACINE, WIS.



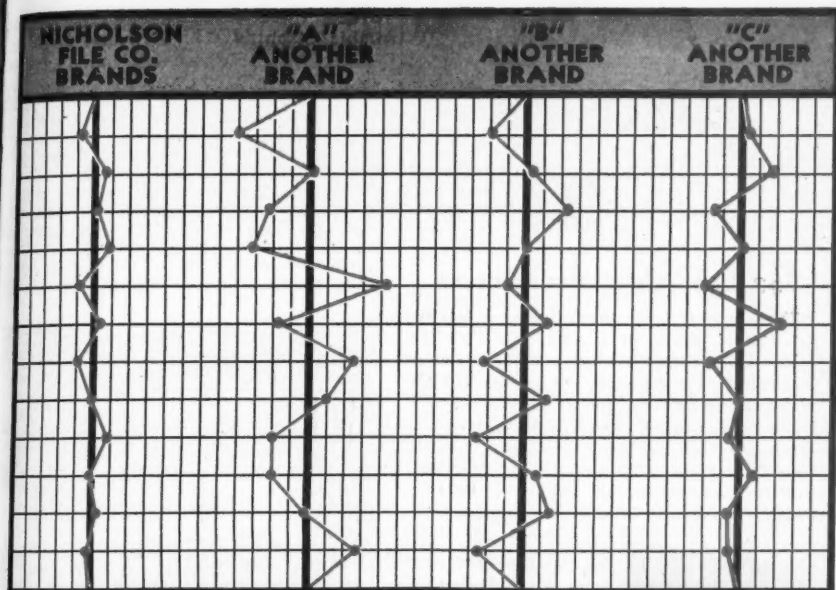
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KEY TO CHARTS—Vertical lines represent an absolutely uniform performance. Zigzag lines show actual variations in performance from absolute uniformity.

CHARTS SHOW THE OUTSTANDING UNIFORMITY OF NICHOLSON FILE COMPANY FILES

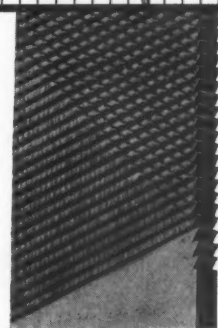
If you are interested in dependable file performance, you can make sure of it by specifying Nicholson, Black Diamond or McCaffrey Files.

Not once, but many times, exhaustive tests show the graph of their performance right up to the line of absolute uniformity.

Uniform quality expressed in dependable performance is worth money in any industrial plant. That is one of the many reasons why our new files have won such a solid, outstanding success.

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A FILE FOR EVERY PURPOSE



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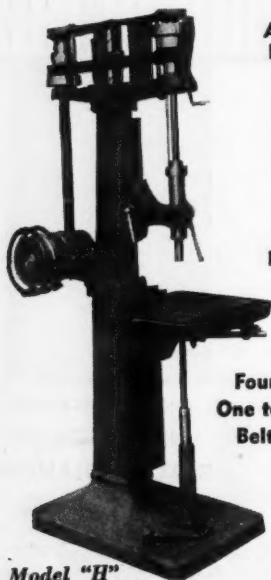
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PROVIDENCE . . . PRECISION . . . DRILLS

For Low Cost Production

Those who measure the value of a tool by the cost of the work it does, will find the PROVIDENCE PRECISION DRILL the most economical they can use. Being EQUIPPED WITH HIGH-GRADE BALL BEARINGS AT EVERY ROTATING POINT, more power is actually applied for production, and less for wearing out the drill. This—and other distinctive features—explain why the PROVIDENCE drills more holes at less cost per hole.



Model "H"

Adapted for
High-Speed
Drilling,
Boring,
Tapping
and
Reaming.

Hand or
Power Feed

Four Models—
One to Six Spindles
Belt or Motor
Drive

Write for
the
Bulletin

PROVIDENCE ENGINEERING WORKS, INC.

521 So. Main St., Providence, R. I.

placed on the market by The Porter-Cable Machine Co., Syracuse, N. Y.

This machine is designated as the Take-About Sander, Type T-4. The frame is of polished aluminum, with molded bakelite intake and exhaust air grids. Both rear and front handles are non-metallic. The front and rear pulleys are each 4 in. wide by $2\frac{3}{4}$ in. diameter. The rear, or driving pulley, is operated through a silent transmission powered by a $1\frac{1}{4}$ h.p. universal motor of any voltage required. The motor is placed in a horizontal position, parallel to the sanding shoe, thus



Porter-Cable "Take-About" Sander

giving the machine a true balance in all directions.

With a belt speed of 1650 r.p.m., the sander is said to remove paint, varnish or other finish materials right down to the base. It is also useful for light metal grinding operations.

A portable belt sander of this type is useful for the elimination of hand labor on both production and maintenance work.

Rasmussen Automatic Metal Cutting Machine

A fast-cutting, automatic saw has been brought out by the Rasmussen Machine Co., Inc., Racine, Wis. Among the many features of the automatic machine are: the machine swivels on its base for angular cutting, thus conserving shop room; has counting dial which registers the number of pieces cut and stops the machine when the proper number has been cut; three speeds by V-belt transmission; slide measuring bar instead of gaging from the end of the stock, thus pieces that are cut off are prevented from jamming



Tells the Story!

Translated into terms of pounds of metal removed per pound of wheel wear, number of pieces or total tonnage ground per wheel—the fast-cutting action of ABRASIVE COMPANY SNAGGING WHEELS means increased production and lower costs on foundry cleaning operations.

For maximum results on swing frame, floor stand and portable grinders we suggest you investigate the application of Abrasive Company Wheels to your snagging requirements. Details gladly sent on request.

ABRASIVE COMPANY

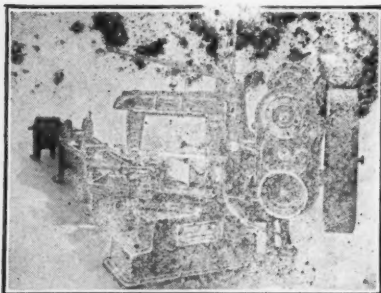


Tacony and Fraley Sts., Philadelphia, Pa.

We will see you at the Foundry Show — May 3-7

DIVISION OF SIMONDS SAW AND STEEL CO.

and breaking blades and slotting operations are permitted that cannot be done when gaging from the end; no



Rasmussen Automatic Metal Cutting Machine

special set-up is required for automatic operation, and the machine can be converted to manual operation by moving one lever.

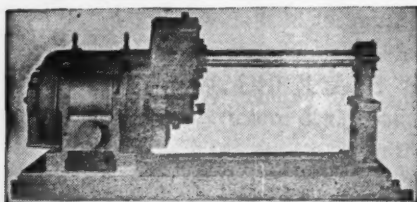
The base is heavy one-piece box-type equipped with a large coolant chamber. The saw guide is of parallel type with liberal V-bearings for the saw frame.

The guide is mounted on a vertical slide with ample bearing surfaces and oiling facilities. Take-up for wear is provided by two easily adjusted gibs. An up-and-down control power is provided when operating automatically. The motor stand is mounted on top of the machine and is adjustable vertically to take care of belt stretch and will accommodate any standard make of motor.

The capacity of the unit is 10x10 in. and at 45 deg., 10x6 in. The weight of the machine without feeder is 1815 lbs. and with feeder is 2445 lbs. The total floor space required, 16 ft. 8 in. by 5 ft. 8 inches.

High Speed Wide Gap Riveting Hammer

The High Speed Hammer Co., Inc., 313 Norton St., Rochester, N. Y., has recently added to its line of riveting hammers a series of wide gap machines which accommodate exceptionally large parts, such as snow shovels, blower fans, impellers, and other large parts. Hub bushings can be readily riveted into place on fans, wheels for toy carts, and



CONE PULLEY DRIVES

● These drives make your machines independent of line shaft location or operation. They often increase production as much as 50%. The 3 bearing drive shown above is the basis of all of our designs. It can be furnished for floor mounting, or, with our supports, for mounting directly on lathes, screw machines, shapers, millers, and other tools. Furnished with heavy duty anti-friction bearings thruout, it maintains accurate alignment and delivers a smooth flow of power under all operating conditions.

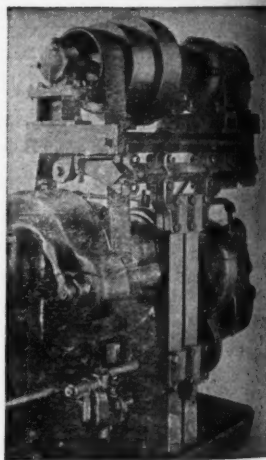
Easily installed.

Reasonably priced.

THE PRODUCTION EQUIPMENT CO.

5219 Chester

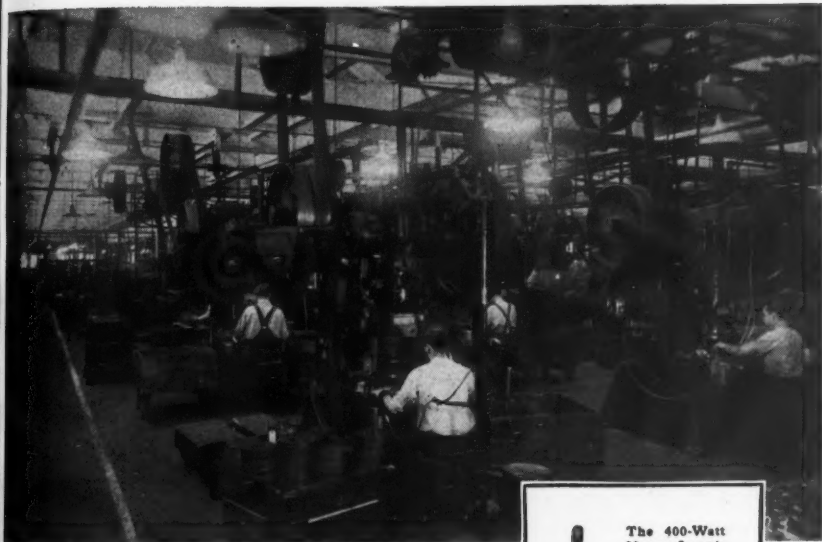
Cleveland, Ohio



REAR VIEW OF SCREW MACHINE DRIVE

HIGHER LIGHTING LEVELS

that step up production



General Electric Mercury Lamps provide this machine shop with high levels of illumination that make "seeing" easy and reduce eye-strain.

General Electric Mercury Lamps afford industry a means of obtaining higher levels of illumination at lower power cost per foot-candle than were ever before obtainable. Both industrial and commercial installations are daily proving the value of such increased illumination. Where there is no waste in the mere physical act of "seeing," eye-strain and resultant fatigue are materially reduced and rejects are minimized. The result is more uniform, more accurately finished goods produced.

General Electric Mercury Lamps may be combined with Mazda lamps to produce an illumination which simulates and blends well with daylight. These combinations are applicable where color discrimination is not an important factor. For complete details address . . .



The 400-Watt Mercury Lamp is 60 to 140% more efficient than other available light sources. It burns vertically only.



By combining Mercury and Incandescent Lamps in many conventional type luminaires, a psychologically cool, white light can be obtained.

GENERAL ELECTRIC

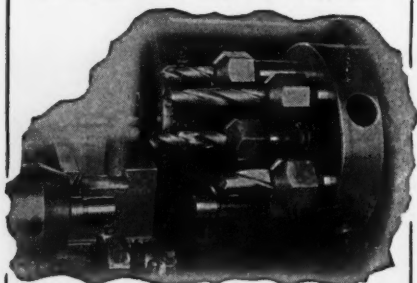
General Electric Vapor Lamp Co.
807 Adams Street, Hoboken, N. J.

764H

Incandescent Lamp Department
Dept. 165, Nela Park, Cleveland, Ohio

Order your auxiliary devices which were designed especially for this lamp from the General Electric Vapor Lamp Co.

UNIVERSAL COLLET CHUCKS



Automatic Screw Machine, holding Drill - Counter-bore - Center Drill and Reamer in UNIVERSAL COLLET CHUCK

[One of the Many Uses]

RIGID
GRIP AS STRONG
AS SOLID
STEEL



CONCENTRIC
WITHIN .001
ACCURATE

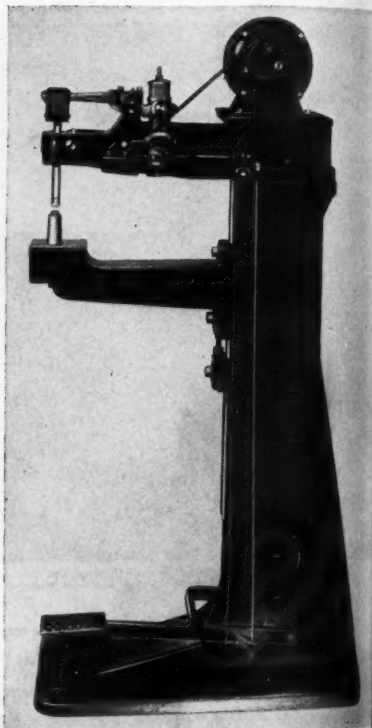
For Holding End Mills, Drills, Taps,
Center Point, Keyway Cutters etc.

FOR LITERATURE WRITE TO

**UNIVERSAL
ENGINEERING CO.**
FRANKENMUTH, MICH.

similar circular parts the radius of which is less than the gap of the riveting hammer.

The machine illustrated is a No. 2-A heavy duty wide gap with a throat depth of 16 in. The motor is mounted



High Speed Wide Gap Riveting Hammer

directly above the column instead of on a motor shelf at the rear. Drive is obtained through a V-belt.

Doall Contour Machine with Dual Dial Control

The Continental Machine Specialties Inc., 1301 S. Washington Ave., Minneapolis, Minn., is now marketing a model in their line of Doall Contour Sawing Machines equipped with a dual dial control. The dual control dial is built into the Doall machine, being mounted on the hinged door. The dial lists 40 different materials. They are in alpha

adius of
the rivet-
No. 2-A
throat
mounted

Try this new

STARRETT S-M MOLYBDENUM

Hacksaw Blade

You'll find it makes a big difference when you have a real metal cutting job to do. The combination of long-wearing Molybdenum and the special Starrett heat-treating process makes a blade that will stand up longer and cut fast even through tough metals like nickel, monel, stainless steel, high speed steel, tool steel, phosphor bronze, etc. Order a trial supply from your distributor. Write for the revised Starrett Catalog No. 25MD.

**BUY THROUGH
YOUR DISTRIBUTOR**



THE L. S. STARRETT CO.

*World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes, Standard for Accuracy*

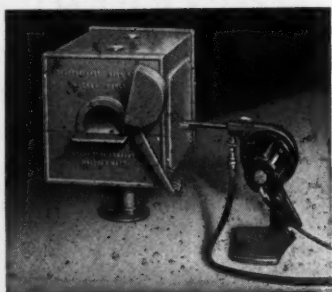
ATHOL, MASS., U. S. A.

Use Starrett Hacksaws

"Stark"

"ELECTROBLAST"

High Speed Heat in 20 Minutes

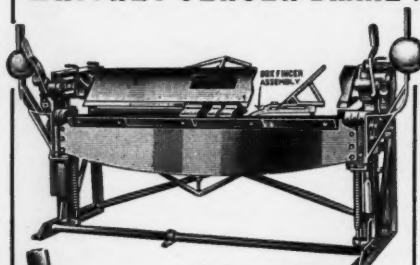


Powerful torch used separately as a very handy portable flame, \$35. High Speed Muffle Furnace, no scaling or decarburization, reaches high speed heat in 20 minutes at 70 per hour; quickly saves its cost. Muffle 7"x3 1/2"x2 1/2", \$35. Also a larger furnace with built-in torch, muffle 7"x4 1/2"x3 1/2".

STARK TOOL CO.

Originators of the American Bench Lathe
Est. 1862 WALTHAM, MASS.

WHITNEY-JENSEN BRAKE



No. 4 Angle
Iron Shear

Ask
for
Cat.
No. 10



No. 8 Imperial
Punch

Whitney Metal Tool Co.

91 FORBES ST.

ROCKFORD, ILL.

betical order around the rim of the dial, beginning with aluminum and ending with zinc. This list includes several trademarked materials such as Monel metal, and all of the common metals and materials used in manufacturing. There is one blank space on the dial to permit the listing of any special material developed in the future.

In addition to dialing the correct saw-



Deall Contour Machine Equipped with
Dual Dial Control

ing and filing speed, this ingenious control also translates the correct saw to use for each material. It also shows the correct selection of saw as to pitch, temper, and set for each of the 48 different materials.

The most important factor in narrow band, contour sawing is the correct speed of the sawing for each material and for each thickness of job. To cut high chrome or high carbon steel, the saw must travel at the rate of 50 to



80,000

**DIFFERENT SIZE GAGES
CAN BE MADE WITH
THIS NEW SET No. 2**

**These 35 Blocks will make this number of gages
in steps of .0001 inch from minimum size .300
inch to more than 8 inches.**

ONLY \$150

For Working Set, accurate to $\pm .000008$ inch.

J O H A N S S O N
GAGE BLOCKS AND ACCESSORIES

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Johansson Division **Dearborn, Michigan**

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**Please send me new Johansson Catalog No. 12 showing all Gage Blocks
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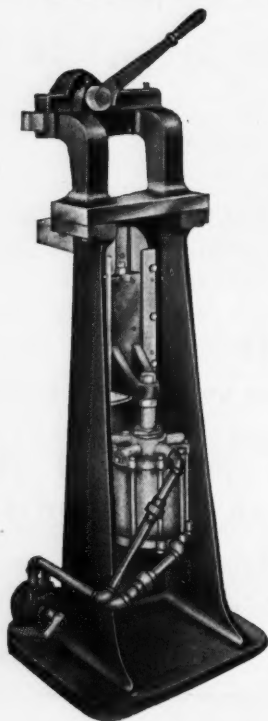
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MARKING

FLAT—ROUND IRREGULAR SURFACES BY ROLLING OPERATION



**MODEL 25
HI-DUTY MARKING MACHINE**

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
1806 BELLE PLAINE AVE.
CHICAGO, ILL.

75 ft. per minute. To cut aluminum castings, the saw must travel 400 to 500 ft. per minute. Thus each different thickness of work and each different material necessitates a different sawing speed. The same is true in filing or polishing when the Doall is used for these functions. Thus the dual control dial is considered a major improve-



Dual Dial Control for Doall Contour Machine

ment. An improved lap grinder and a wide adjustment in the saw guide is also provided in the Doall Contour Machine.

Sundstrand Fluid Motors

The Sundstrand Machine Tool Company, 2529 Eleventh St., Rockford, Ill. has announced a line of fluid motors



Sundstrand Fluid Motor

of a multiple piston type. The first unit to be introduced has a rating of 1 h.p. at 900 r.p.m. Larger capacity fluid motors of the same type are to be placed in production in the very near future.

The 1 h.p. unit is said to be very

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IF CUTTING TOOLS COULD TALK...



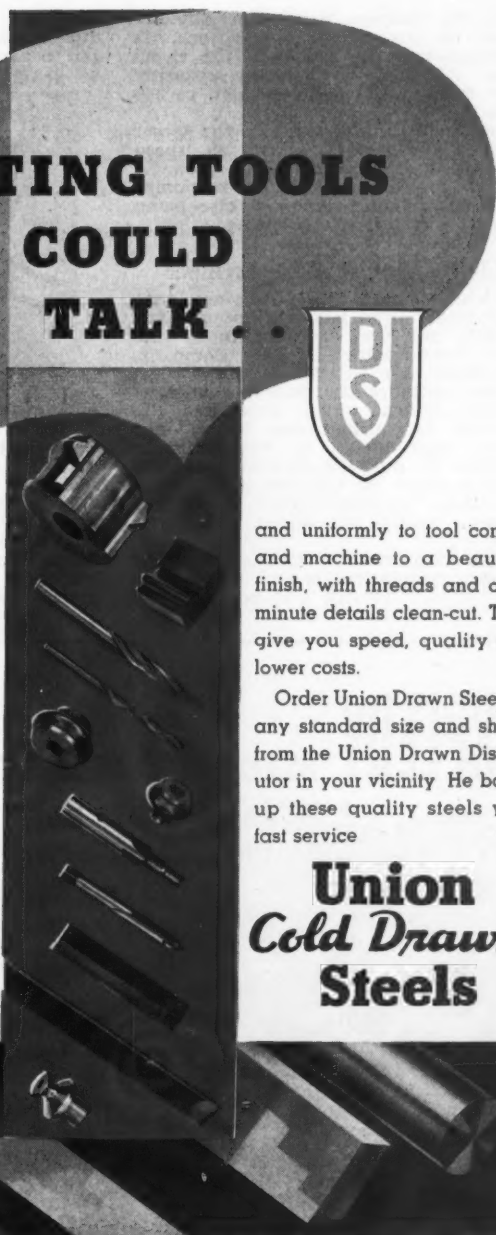
—they would explain that cutting edges hold out longest against steel that is easiest to machine. Tools that hold their cutting edges need less grinding and fewer changes—they keep machines going with fewer interruptions—they last longer, cost less and pay higher dividends in production

For highest machinability on jobs requiring Bessemer screw steels—specify Union Drawn. We have largely eliminated the tool-dulling abrasive elements commonly found in these steels. They respond rapidly

and uniformly to tool contact and machine to a beautiful finish, with threads and other minute details clean-cut. They give you speed, quality and lower costs.

Order Union Drawn Steels in any standard size and shape from the Union Drawn Distributor in your vicinity. He backs up these quality steels with fast service

Union Cold Drawn Steels



small and compact, being especially designed for high speed applications. It is also suitable for speeds as low as 20 r.p.m. It can be reversed instantly while running at speeds as high as 300 r.p.m.

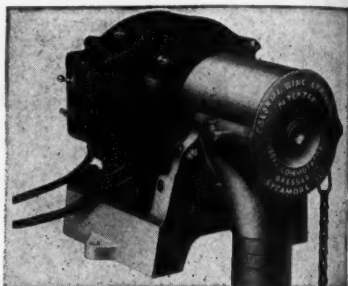
The 1 h.p. unit as well as the larger sizes are built with a variable speed adjustment or for a constant speed. A complete line of multiple piston pumps for use with their motors is also being brought out by this company.

Ideal Colonial Wire Stripper

A wire stripper without springs, that strips either from left to right or right to left, has been announced by the Ideal Commutator Dresser Company, 1445 Park Ave., Sycamore, Ill. The stripper employs the principle of centrifugal action, which eliminates the necessity for springs and levers. The double edge blades in the stripping chamber fly outward in motion and a slight pressure on the foot pedal closes the blades to within 0.001 in. of the diameter set by the dialed micrometer gage.

When the wire is inserted into the stripper, insulation is cut clean, the wire properly twisted and polished and

ready for terminals or soldering. The duplex blades are of fine tool steel and can be resharpened indefinitely. Since

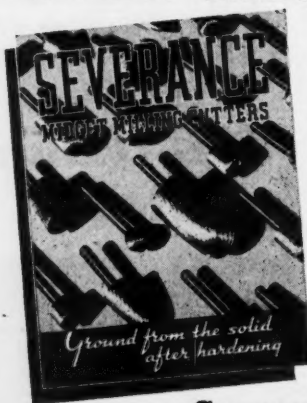


Colonial Wire Stripper

some wires are twisted from right to left, the Colonial Wire Stripper is designed to operate counterclockwise when desired. The change is made by means of a small switch.

The unit is equipped with a stop which can be instantly set for any length of strip up to 2 in. The complete unit, with its $\frac{1}{4}$ h.p. reversible

SPEEDY MIDGET MILLING CUTTERS



NOW EASY TO ORDER FROM THIS SMART NEW CATALOG

Here's the latest in catalogs packed with pictures and facts about the latest in tools!

17 DIFFERENT SHAPES, 114 SIZES PICTURED

Severance cutters cut sharp chips, do the job better, quicker, and cheaper than rotary files or mounted grinding points. The new catalog lists 170 different Severance tools.

FREE Write for your copy of the new Severance catalog to-day. No charge or obligation whatsoever.

Severance Tool Manufacturing Co.
1516 E. Genesee Avenue • SAGINAW, MICHIGAN

1937

April, 1937

MODERN MACHINE SHOP 155

SKINNER CHUCKS

He lays into this chucking operation!

There's a real cut coming!

An extra two foot extension slipped over the chucking bar for greater leverage, a husky heave and the jaws of the Skinner Chuck clamp the heavy casting with a grip that holds the cut true.

These modern Warner and Swasey Turret Lathes, with their remarkable speed and precision in heavy duty service, put plenty of responsibility upon the chuck. There you'll find Skinner Chucks. With their generous body proportions of selected grade steel, long scroll, and ample length of bearing in jaw ways, Skinner Chucks resist strain and wear and assure long lived accuracy.

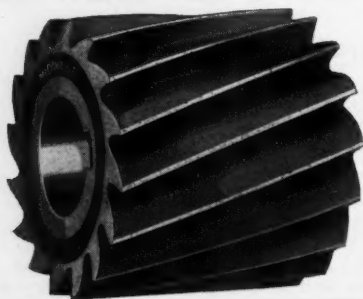


SKINNER CHUCK CO.

NEW BRITAIN, CONN., U.S.A.

LATHE—DRILL—PLANER CHUCKS • VISES—POWER CHUCKS—CYLINDERS

FROM Standard Plain



Midwest Cutters for very kind of cut

CORRECTLY designed to cut freely, eliminate chatter, and provide ample chip clearance.

Catalog 14-M shows Midwest complete line of standard and special Milling Cutters and End-Cutting Tools. Send for a copy.

Midwest Tool & Mfg. Co.

2358 W. Jefferson Ave.
Detroit, Michigan

TO Special Form



type heavy duty ball bearing motor requires no special installation and can be set in any assembly line or convenient place. A flexible metal tube carries waste strippings to a disposal container.

Sheffield Comparator Gage

The Sheffield Gage Corporation, Dayton, Ohio, has recently announced a new comparator type instrument. It is said to retain many of the Sheffield



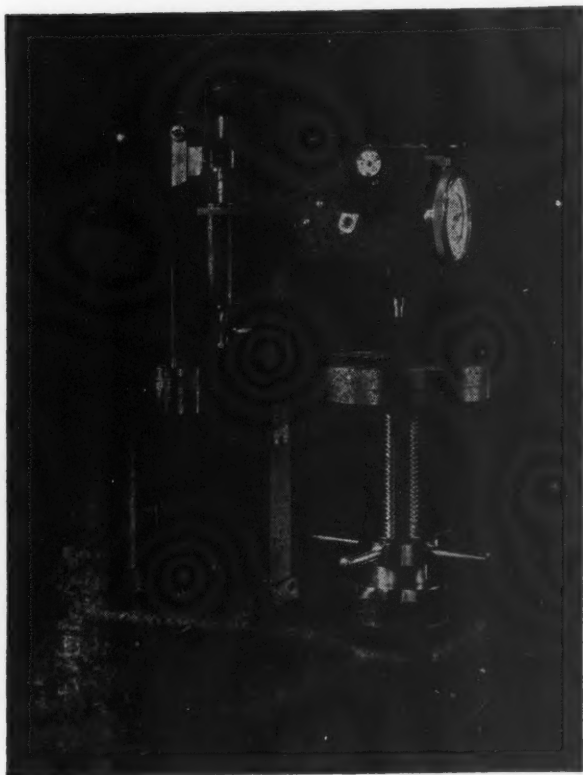
Sheffield Comparator Gage

Visual exclusive features and also to offer a real economy in the field of comparator gaging.

The gaging head is similar to that of the Sheffield No. 3 Visual and utilizes the patented Sheffield fine adjusting sleeve for rapid, easy movement of the dial hand to the final setting. The gaging head is raised and lowered by a convenient hand wheel at the right, which provides smooth, free adjustment to the proper height above the lower anvil. The clamping wheel on the left

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W MICHA



A "ROCKWELL" SUPERFICIAL Hardness Tester

may be needed in your plant, in addition to your regular "ROCKWELL", for testing thin metal or lightly carburized or nitrided steel—or other work where the indentation must be particularly minute. In steel of Rockwell C65 the indentation made by the 30 kg. test with the "Superficial" is about one-quarter as deep as with the 150 kg. on the regular "ROCKWELL". With the 15 kg. test on the "Superficial" it is much less than that. Yet the "ROCKWELL" Superficial has the same direct reading features, convenience, speed and adaptability as the regular "ROCKWELL" and is being used for rapid routine inspection testing out in the shop. Its sensitivity is unsurpassed and its adaptability unequalled. It is the logical machine for all shallow indentation hardness tests in either laboratory or works.

WILSON

MECHANICAL INSTRUMENT CO. INC.

Concord Ave. & 143rd St., New York, N. Y.

quickly and surely locks the head at the precise height.

The entire gaging head may be swiveled on the column to provide gaging from surfaces other than the self-contained anvil. Standard make indicators are mounted on the gaging head. These can be secured in both the one-thousandth and three-thousandth range. Either indicator may be read rapidly to tenths by the operator. A rugged base carries the standard Sheffield Visual Gage anvil and in addition, special anvils can be supplied for unusual requirements.



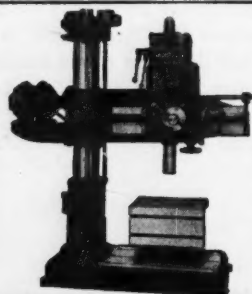
for

GRINDING POLISHING SURFACING

The Type R machine is a combination of three machines—the disc grinder, the polishing wheel, and belt surfacing machine. You can save money and greatly improve the quality of your work with this "Production" machine. Many other types of polishing machines available. *Write for circulars.*

Production Machine Co.

GREENFIELD, MASS.



MORRIS "MOR-SPEED" RADIAL DRILLS

FEATURE:

Rigidity—Convenience—Power—Simplicity—Low Cost.

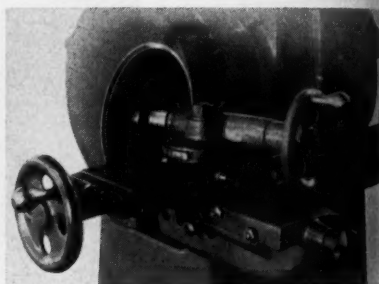
Don't fail to investigate the "MOR-SPEED" line of Radials. Full facts on request.

THE MORRIS MACHINE TOOL CO.
CINCINNATI OHIO

The steel column carrying the gaging head is pressed into the base at the rear. The gaging spindle or upper anvil is of the same design as used in Sheffield Visual Gages. On continuous operating tests, this spindle consistently shows no appreciable wear, even after more than twenty-five million consecutive gagings. This instrument possesses the fine workmanship characteristic of Sheffield products and is a valuable addition on those applications where the accuracy of the Visual Gage is not required.

Landis Roller Cutter Disk Grinding Attachment

A grinding attachment for resharpening cutter disks as used on a roller pipe cutter is being marketed by the



Landis Roller Cutter Disk Grinding Attachment

Landis Machine Company, Waynesboro, Pa. This attachment is adapted for use on any Landis Chaser Grinding Machine and was particularly designed for regrounding roller cutter disks used on the Gelst Roller Cutter which is marketed by the above firm.

... CLEANER, FASTER cut-offs



● Cleaner and faster because they incorporate the experience of years of study in the laboratory and in the field. Cleaner and faster because they incorporate the most up-to-date methods of manufacture and materials.

cut-off wheels of correct structure for the cutting job. No matter what material you wish to cut a STERLING Resinoid cut-off wheel will give you a cleaner and faster cut. May we suggest you

The STERLING process of manufacture assures

USE STERLING—THE WHEEL OF INDUSTRY

THE STERLING GRINDING WHEEL CO.

Abrasive Division of The Cleveland Quarries Co.

Factory and Office: TIFFIN, OHIO • CHICAGO: 912 W. Wash. Blvd. • DETROIT: 101-107 W. Warren Ave.

STERLING ABRASIVES

By removing the steady rest in front of the straight wheel on the Landis Chaser Grinder, room is provided for bolting the disk cutter grinding attachment directly to the machine bed. The attachment will take disks of 6-in., 7-in., or 8-in. diameter. The cutter disk is mounted on the end of a cutter shaft which is adjustable in a horizontal plane for obtaining any desired bevel on the cutting edge. A hand wheel on the opposite end of the cutter shaft permits revolving the cutter disk against the face of the grinding wheel in order to uniformly grind its entire circumference. Infeed is provided by means of the hand knob at the front of the attachment and cross traverse by the hand wheel at the left of the attachment, which permits withdrawal of the slide for mounting and removing the cutter disk.

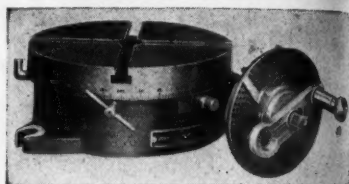
All tables and slides are gibbed so as to provide compensation for wear. Alemite forced lubrication is used for all sliding and revolving surfaces.

Stevens 7½-In. Dial Indexing Rotary Table

A 7½-in. diameter rotary table, made in the dial indexing type similar to a

dividing head, has been brought out by John B. Stevens, Inc., 304 Hudson St., New York, N. Y.

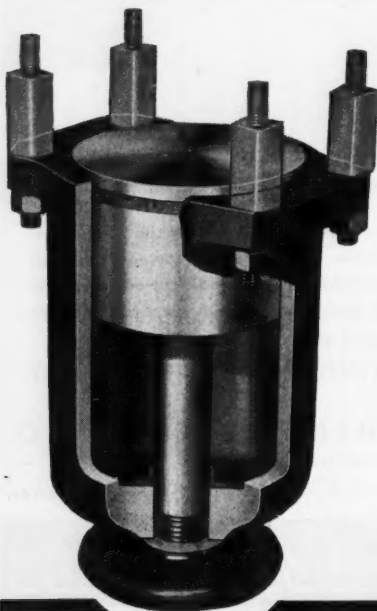
In the 7½-in. size and type, the worm gear is very large in diameter, and the method employed for engaging the worm



Stevens 7½-In. Dial Indexing Rotary Table

in same assures a total absence of lost motion or lash. End thrust take-up for worm is provided.

The edges of the tables are provided with 360 graduations for ratings in degrees, with an adjustable zero line. Worms revolve in oil bath while all moving fits can be readily lubricated. The worm and gear can be quickly disengaged for swiveling the table by hand with a means provided for binding the latter at any point. The table section



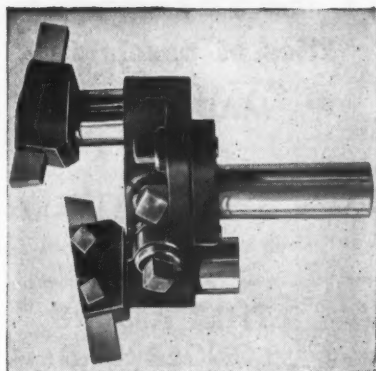
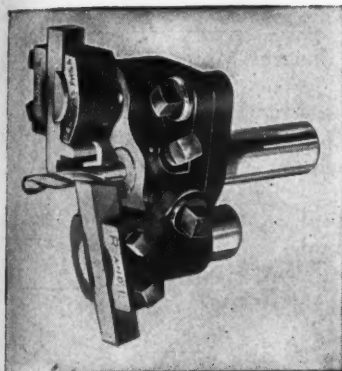
NEW IMPROVED UNIVERSAL PNEUMATIC DIE CUSHIONS

1. Self-contained, portable unit quickly installed on any punch press.
2. Can be applied to an advantage to dies already in use in the place of springs and rubbers.
3. Ideal for jobbing shops; used to an advantage in both short and long runs.
4. The entire piston area always available for knock-outs, ejectors and die pressure actions.
5. Adaptable to both shallow drawing and compound blanking and piercing work.
6. Hand wheel adjustment for bolster plate thickness variation.
7. Piston fully guided; cushion readily mounted, eliminating all piston deflection.
8. Made in seven sizes at moderate prices.

Write for detailed catalogue and prices.

DAYTON ROGERS MFG. CO.
MINNEAPOLIS, MINN.

THE **R & L** TURNING TOOL



We Made Claims- You Proved Them

Less than a year ago, R & L TOOLS were offered to the metal working industry with claims that they would increase production—cut costs—give better finish and greater accuracy—save over \$200.00 on initial investment. The widespread and fast growing acceptance of R & L TOOLS proves conclusively that these claims are being fulfilled.

The new R & L TURNING TOOL can be used for roughing and finishing cuts, right or left hand—as a balanced turning tool with two cutting edges—as a combination turning and burnishing tool—for simultaneous drilling and turning.

If you have not yet tried R & L TOOLS, it will pay you to investigate them, just as scores of satisfied users have done. Write today for information.

R & L TOOLS

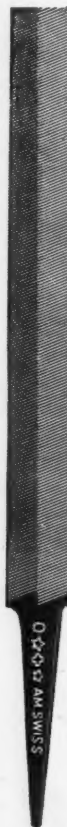
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**American Swiss
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ELIZABETH, N. J.

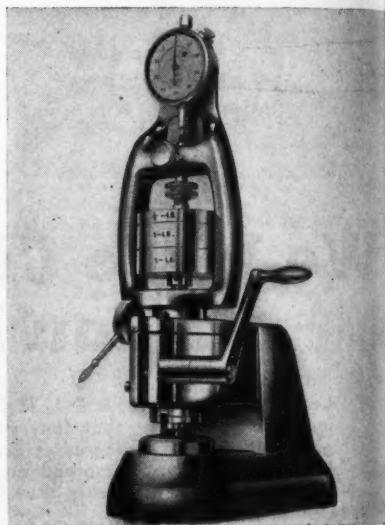


of these circular attachments are made from a semi-steel casting and have a large area of bearing on in the base, and is fitted in a manner which assures long life of the original, or proper, fit.

Tongues of widths as desired are supplied as well as holding-down bolts and wrench equipment. The height of the rotary table is 3-5/16 in., and the weight of the entire unit is 42 pounds.

Federal Model 1122 Hardness Testing Gage

A hardness testing gage designed in accordance with standards of the American Society for Testing Materials and identified as the Model 1122 has been



Federal Model 1122 Hardness Testing Gage

added to the line of testing and indicating instruments made by Federal Products Corporation, 1144 Eddy St. Providence, R. I. The gage is intended for use in determining the hardness of rubber, cork, felt compositions and similar materials. The design of the gage is such that a true determination of the amount of penetration is obtained. Variations caused by surface irregularities are eliminated by pressing the material first by a fixed amount and then allowing the penetrating point to find its own resting point. Constant pressure is maintained throughout the test by

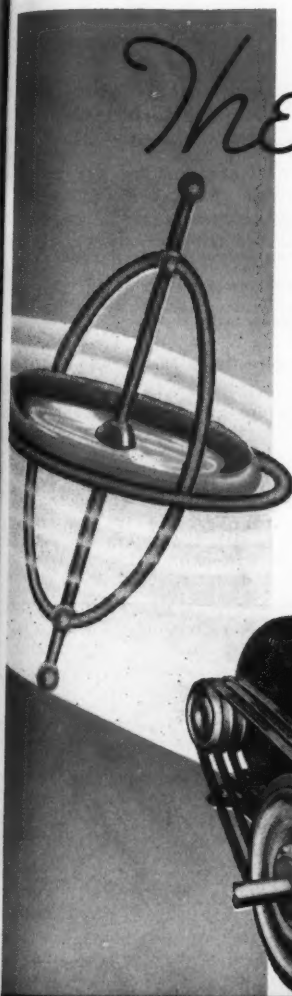
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IN DYNAMICALLY BALANCED SHEAVES FOR V-BELT DRIVES

Aware of the trend toward precision in plant modernization, Allis-Chalmers engineers now make the finest dynamic balance commercially available in Texrope Sheaves. This, again, illustrates the forward-looking policy and engineering capacity of the company.

Allis-Chalmers offers this accurately balanced and completely vibrationless sheave for applications where dynamic balance is necessary or desirable. Extreme accuracy may not be necessary on your job, but whatever your job is and whatever V-Belt drive equipment you may require, you get Allis-Chalmers engineering experience and ability built into it when you buy Texrope V-Belt Drives.

Allis-Chalmers originated and pioneered the multiple V-Belt drive principle, and has always maintained its position of leadership in that industry.

If you want the best multiple V-Belt drive equipment, buy from multiple V-Belt drive headquarters—Texrope Division of the Allis-Chalmers Mfg. Co.

Write for Duro-Brace Bulletin No. 2188

Belts by Goodrich

TEXROPE DIVISION
ALLIS-CHALMERS



MILWAUKEE WISCONSIN

weights. The movement of the pressure members is simple and the mechanism is convenient to operate, thus facilitating the making of tests. Other anvils than flat can be furnished if required.

As shown in the illustration, the penetrating point is just above the anvil. This point exerts a certain known pressure as it enters the sample. Just above the point of contact is a flat anvil which is brought to rest on the surface of the sample under a certain known weight and clamped in the "at rest" position. The penetrating point is then released and the amount of penetration is read on the dial. Weights are made to conform to A.S.T.M. standards and can be adapted to other standards.

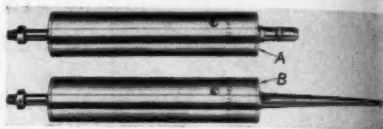
The total weight of the upper anvil is 5 lbs. and the diameter is $5/8$ in. The total weight on the penetrator point is approximately 3 lbs. The weights are of the U-type, interchangeable. Diameter of the penetrator is $5/32$ in. Diameter of lower anvil, 2 in. Maximum thickness of sample that can be tested, 1 inch.

The indicator is the Model C81, graduated to 0.001 in. with a range of 0.003 in. The dial, with telltale, is 0.100. No

pull-back spring is used. Weight on rack, 5 grams. Height of gage, $14\frac{1}{4}$ in. Base, $6 \times 7\frac{3}{4}$ in. Finish, chrome plated.

Four New Quills for the No. 7 Dumore Grinder

Two new quills, shown in the accompanying illustration, have now been placed on the market for use with the



Dumore Quills Nos. P and N-6

No. 7 Dumore grinder manufactured by The Dumore Company, Racine, Wis. The quill designated as A is known as the "P" quill. It is equipped with a $1/4$ -in. chuck for use with mounted wheels and also a sleeve collet of $1/8$ -in. capacity. Its primary use is for grinding small holes with diameters of less than an inch to a depth of $1\frac{1}{4}$ inches.

The quill designated by B is the "N-

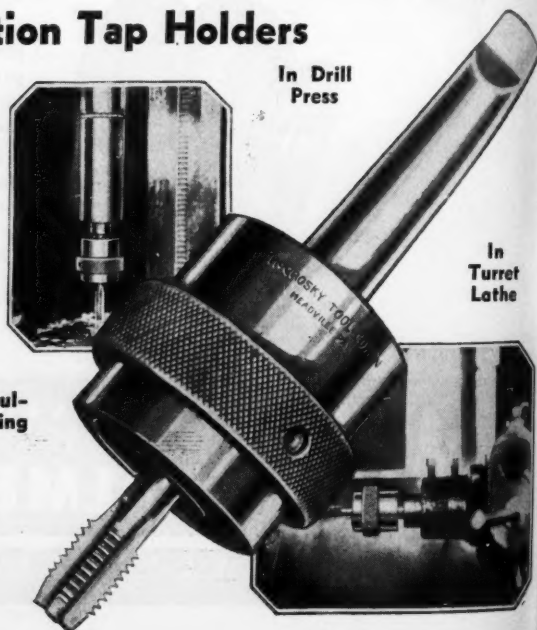
WIZARD Friction Tap Holders

PERMIT tapping blind holes at drilling speed.

Friction adjusted without removing holder from machine.

Three sizes to handle taps from $3/16$ " to $1\frac{1}{4}$ ". Send for complete bulletin on WIZARD tapping and drilling equipment.

McCrosky Tool Corporation
Meadville, Pa.



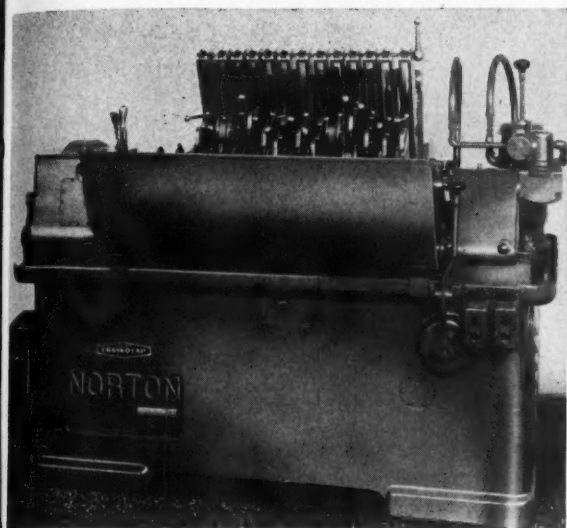


Fig. 1—No. 30 Crank-O-Lap. Front view with splash guard in position.

6 in. which is capable of grinding a hole 11/16 in. in diameter and 6 in. deep. It is also capable of grinding smaller diameters to a respectively shorter depth. For instance, it can grind a 7/16-in. hole to a depth of 2 inches.

Another quill, not illustrated, is the N-5 which is equivalent to the N-6, except that its maximum depth of grind is 5 in. The fourth quill is known as the V-6 and is equivalent to the N-6, except that it is used with the No. 5 Dumore grinder, whereas the N-6 is used with the No. 7.

Norton Crank and Cam Lapping Machines

Two new machines for lapping all bearing surfaces on crankshafts and camshafts have been recently announced by Norton Company of Worcester, Massachusetts. They have been named "Crank-O-Lap" and "Cam-O-Lap". The type No. 30 Crank-O-Lap, Fig. 1, is driven by a motor mounted on the base which connects to the headstock by a V-belt and to a hydraulic pump by a flexible coupling.

The heavily ribbed box shaped base supports the work table and lapping arm frame. The table in

turn supports the headstock, footstock and work rests and is of substantial construction. It is provided with hardened steel vee shaped ways which bear on steel balls. As the table reciprocates when work is being lapped, the steel ball bearings reduce friction to a minimum.

The lapping arm frame is pivoted and carries a bar to which guides for the arms are fastened and also a shaft for spools of abrasive paper strip. Lapping arms are jointed so they will follow the pins of a crankshaft as it revolves. Take-up spools for winding the used abrasive strip are carried at the ends of the arms and operated by ratchets and pawls.

Actual lapping of each pin and bearing is done by shoes of the correct form which hold the abrasive strip firmly in place against the surfaces to be lapped. These shoes are closed by convenient levers. Lapping lubricant is automatically pumped on the work while it revolves. Fig. 2 shows crankshaft in machine with lapping arm in back position.

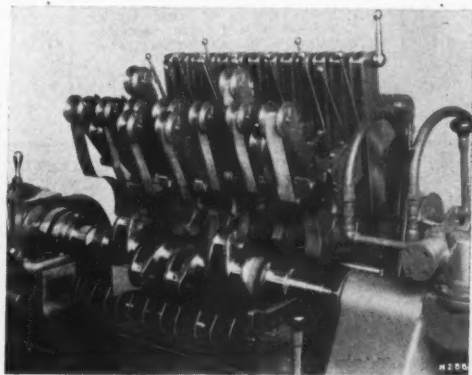


Fig. 2—No. 30 Crank-O-Lap with crankshaft in position and machine arms raised.

The type No. 30 Cam-O-Lap, Fig. 3, is built on the same base as the crankshaft lapping machines. The differences in the machines are in the application of the abrasive strips and action of the lapping arms.

Unit pressure against cam surfaces must remain constant. This is accomplished by providing a master cam for each cam lapping arm, thus controlling the movements of the arms and causing them to exert a uniform lapping action on each cam surface. Abrasive strips are held against cams by shoes of the proper size, the movement of which is controlled by the master cams.

To produce the proper grade of finish, the abrasive strips and supports are re-

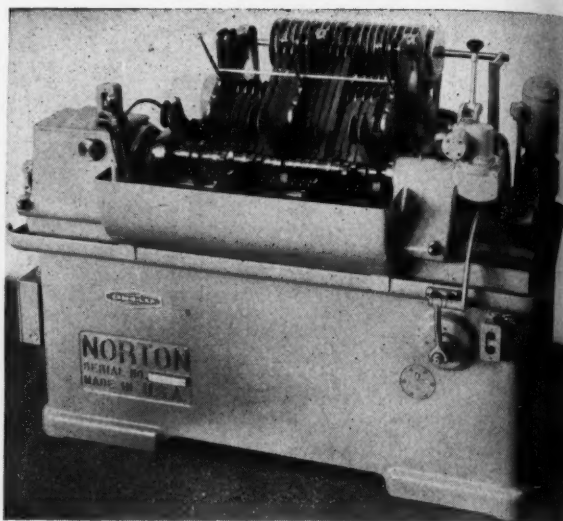


Fig. 3—No. 30 Cam-O-Lap.

ciprocated rapidly in the direction of the camshaft axis which the camshaft is rotating and reciprocated with a slower motion. These motions result in the crossing and recrossing of the paths followed by the laps and produces the degree of finish required.

A separate set of lapping arms identical with those used for crankshaft lapping are employed for lapping the camshaft bearings. Cam contours and camshaft bearings are lapped simultaneously.

As in the case of crankshaft lapping, lubricant is automatically flooded on the work surfaces during the operation.



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LINLEY NOISELESS ROTARY RIVETING MACHINES

Assure Peak Production and Lower Maintenance, Rigid and Powerful, Bench and Floor Types, Motor or Belt Driven. There is a Linley machine for every riveting job.

Send Samples of your Work and we will furnish accurate estimate of production and quote cost of equipment.

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EXTENSION BED GAP LATHE

24/48"—28/50" Swing ALL GEARED OR CONE HEAD

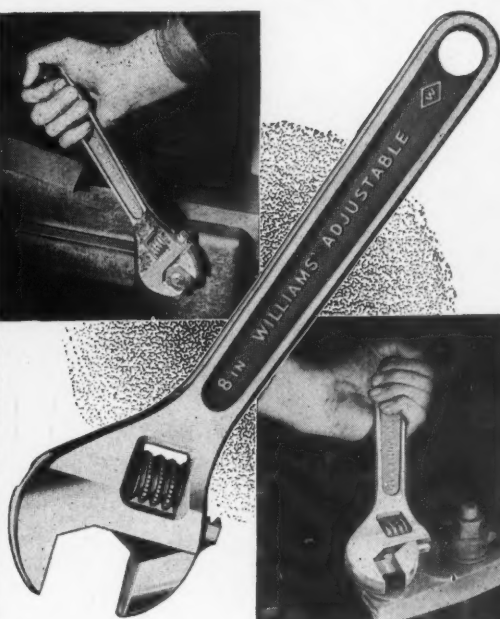
A lathe for small and large swing work. Long distance between centers. Three lathes in one. Saves space. Reduces cost.

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IDEAL
WRENCH
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Action!



The WILLIAMS' ADJUSTABLE

IT'S the outstanding adjustable wrench for all-around shop work. New design features provide extra strength with no increase in head thickness. New materials make it the strongest carbon-steel wrench of its type made today. And, because it comes from

Williams, it's **FULLY GUARANTEED.**

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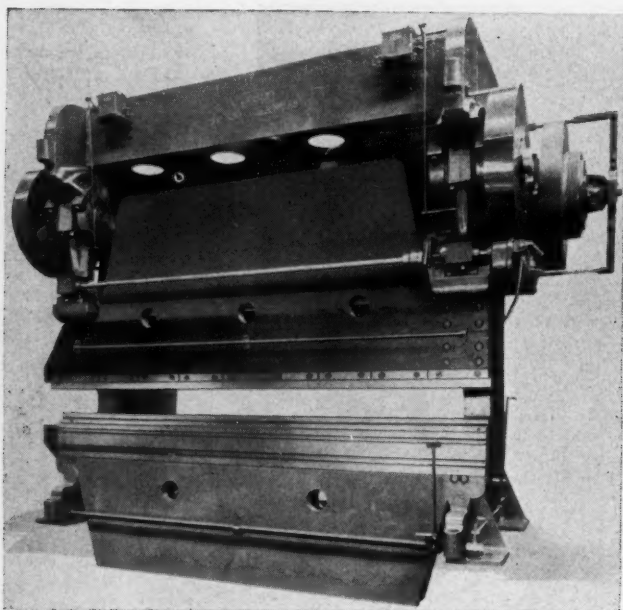
Headquarters for: Drop-Forged Wrenches (Carbon and Alloy), Detachable Socket Wrenches, "C" Clamps, Lathe Dogs, Tool Holders, Eye Bolts, Hoist Hooks, Thumb Nuts and Screws, Chain Pipe Tongs and Vises, etc., etc., etc.

"SUPERRENCHES"

Williams also manufacture a complete line of "Superrenches" (Chrome-Molybdenum) and Detachable "Super socket" Wrenches. Thin, strong, handsomely finished in chrome-plate.

"SUPERSOCKETS"

WILLIAMS
 SUPERIOR DROP-FORGED TOOLS



Vernon Allsteel Press Brake

Vernon Allsteel Press Brake

A complete line of Allsteel Press Brakes has been added to the list of products built by The Allsteel Press Company, Chicago, Ill. There are five series of these new Press Brakes, comprising twenty different standard sizes. However, variations from standard dimensions are possible if desired, so almost any size is obtainable at little or no extra expense.

The Vernon Press Brakes are built entirely of steel, heavy steel plate sections being welded into rigid non-deflecting

members, with the main bearings so located as to absorb the load directly in the center of the main housing plates. These bearings are of the split cap design for take-up in case of wear and are equipped with bronze bushed bearings. A special design of the pitman connection has been incorporated whereby the bending moment on the adjusting screws is reduced to a minimum.

The bed of the new Vernon Allsteel Press Brakes is unusually deep and is of two plate construction to allow slugs to fall through in gang punching; it rests on a round saddle in the housing. These Brakes are

regularly furnished with a "V" belt drive, gear tooth drive, friction clutch, motor adjustment on the ram, automatic force feed lubricators, and lower die holder.

An interesting feature of the construction is that the elevating shaft is split and connected by a jaw coupling, which arrangement allows either side of the ram to be raised or lowered individually for re-alignment or taper work.

Evans Reaming Shop

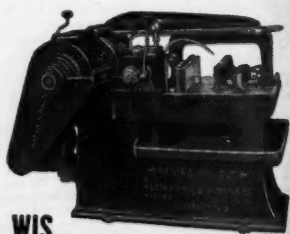
The assortment of equipment shown in the illustration comprises what is

RACINE

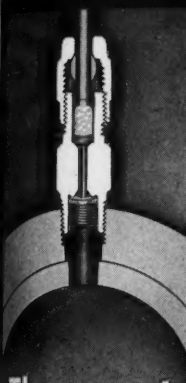
METAL CUTTING MACHINES

"Standard the World over"

RACINE TOOL AND MACHINE CO • RACINE, WIS.



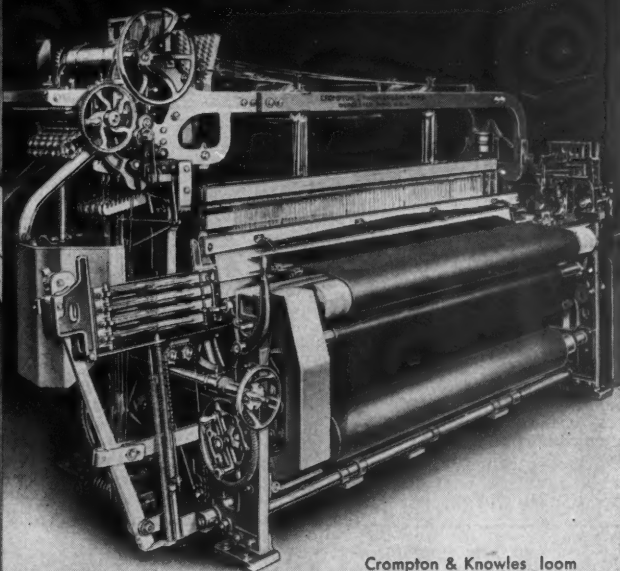
INSURING YOU AGAINST NEGLECT



The correct
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BIJUR

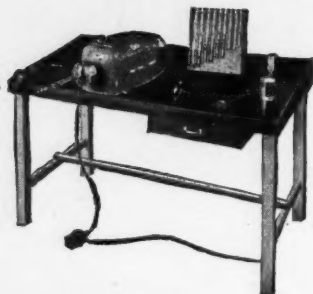
AUTOMATICALLY *Correct* LUBRICATION

● Expensive "I-forgot's"... the faults of any imperfectly controlled method of lubrication... may heavily burden maintenance and production costs. A BIJUR lubricating system unfailingly protects your machine against such neglect... Insures, too, the soundness of your investment. Each bearing... whatever its size, speed and load... is automatically fed the amount of oil it individually requires!

BIJUR LUBRICATING CORPORATION

LONG ISLAND CITY, NEW YORK

known as the Evans Reaming Shop, now being offered to the trade by Evans Flexible Reamer Corporation, 3656 Lincoln Ave., Chicago, Ill. The "shop" in-



Evans Reaming Shop

cludes a three-speed reamer drive, vise to hold shafts or pins while fitting, gage for setting the reamer to the size of the shaft, and a variety of expanding reamers which can be obtained singly or as a complete set.

The reaming machine is equipped with a chuck that will handle reamers up to $2\frac{1}{2}$ in. in diameter, for which

power is supplied by a $\frac{1}{4}$ h.p. A.C. 110 volt, 50 or 60 cycle, single phase motor with foot switch. The machine can be operated at speeds of 30, 60 or 100 r.p.m. The vise will hold a shaft or wrist pin securely while work is being fitted to it and will not distort the pin. To set the reamer to the work size for any given shaft, the shaft is inserted in the gage and the adjusting nut is revolved until a snug fit is obtained in the gage jaws. The shaft is then removed and the reamer is inserted. The reamer is expanded until the cutting edges touch the interior surfaces of the gage jaws, then the reamer is backed one-quarter turn, which sets it for the roughing size.

The reamers are of special alloy steel and the blades in a single reamer are set on both right and left hand spirals, which makes it impossible for the reamer to chatter or for the blades to engage in keyways or other slots in the work. The reamers can be expanded from 50 to 80 thousandths inch, the amount depending on the size of the reamer. All of the above-mentioned equipment is included with an all steel work bench $2\frac{1}{2}$ ft. wide and 5 ft. long. A drawer can be provided in the bench if requested.

NEW

U. S. No. 1 Anti-Friction Bearing Hand Milling Machine

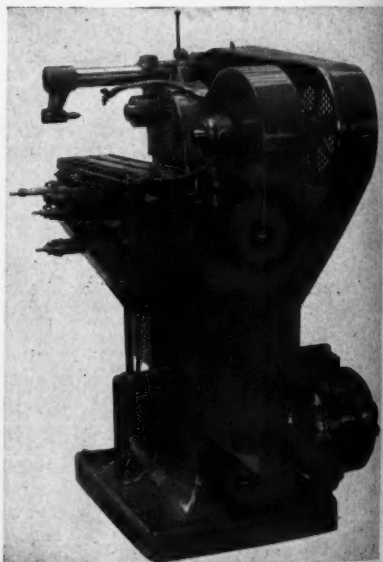
The New U. S. Hand Miller is particularly adapted to high speed light milling operations. Vertical and horizontal feeds.

Improvements: Heat treated chrome nickel steel spindle, Timken bearings, Ballbearing countershaft, V-belt drives, 6 Spindle Speeds up to 1592 R.P.M., providing efficient use of small end mills.

Write for full details.

**The UNITED STATES
MACHINE TOOL Co.**

1954 W. 6th St., Cincinnati, Ohio



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THE *New* WAHLSTROM SEMI-AUTOMATIC CHUCK...MODEL *P*

Why treat your New Drills as you had to treat the Old Ones?

MARRED and scored drill shanks cause poor results. Drills which must be held in the chuck by other than finger-tight pressure of the jaws are bound to be marred, and thus have a very limited life.

In this new design of Model P Chuck, finger-tight pressure is all that is needed to hold the drills. No keys or wrenches are necessary, because the jaws are designed to rock to a gripping pressure

without scoring or marring the shank, when drilling pressure is applied.

In this new design, the chuck jaws are protected by the shell; extreme protrusion of the jaws is eliminated, preventing the jaws from springing out of shape under pressure, or being broken if the chuck is dropped.

The Model P is quick and easy to load or unload, because of the long sleeve that permits the operator to grasp the chuck firmly while releasing or inserting the drill.

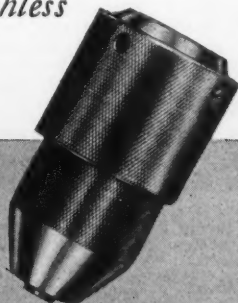
An economical tool—saving drill shanks—speeding up production.

Wahlstrom Tool Division
American Machine & Foundry Co.
5502-5524 Second Ave., Brooklyn, N. Y.

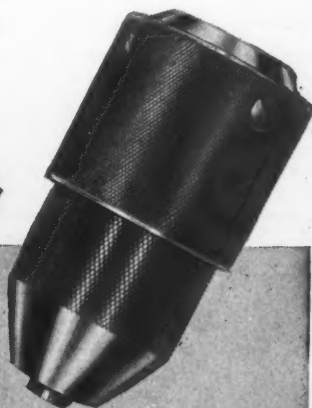
Keyless-Wrenchless



No. 51
Cap. 1/64" to 1/4"



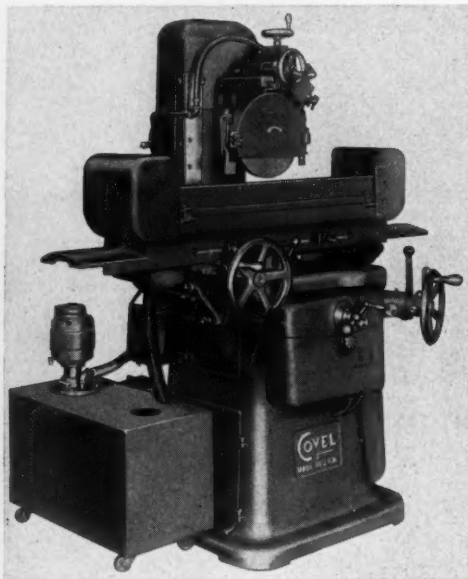
No. 53
Cap. 1/64" to 3/8"



No. 54
Cap. 1/32" to 1/2"

Covel No. 5 Hydraulic Surface Grinder

To meet the demand for a surface grinding machine designed to absorb vibration and maintain accuracy over



Covel No. 5 Hydraulic Surface Grinder

a long period of time, Covel Manufacturing Co., Benton Harbor, Mich., has brought out the No. 5 Hydraulic Surface Grinder illustrated herewith. An outstanding feature of the machine is the protection against abrasive dust. Elevating screws and nuts and the vertical slides are completely enclosed by tele-

scoping guards, and the cross feed adjustment mechanism is covered by the guard which is hinged for ready adjustment of cross feed travel.

The table speed is variable from 10 to 90 ft. per minute, which makes practicable the use of harder and more open grinding wheels, resulting in faster production and a better finish. At 90 ft. per minute the table reverses without shock, even when grinding heavy work. All controls are easily reached from operating position. To facilitate the lowering of the grinding wheel into the work, the elevating hand wheel is placed at the working level of the machine and at the operator's right. Thus the operator can quickly sight the surface to be ground and can look down on the graduations, reading them easily and accurately. A ball bearing throttle valve expedites changes in the table speed. The hydraulic pump is V-belt driven by a 2 h.p. motor. Both pump and motor are mounted on vibration absorbing material.

The cartridge-type direct motor driven spindle runs in precision ball bearings and is supported by a massive head to eliminate vibration. The spindle and motor are balanced as a unit. Extreme accuracy in vertical movement of the grinding wheel is obtained through a double elevating screw mechanism.

The wheel-truing device, built into the head, is optional. With this feature the grinding wheel can be dressed quickly and accurately. When dressing the wheel it is unnecessary to disturb the set-up on the table or magnetic chuck. Spindle bearings are lubricated by a sight feed oiler. Each table way is oiled in three places by fibre rollers



GREENERD Arbor Presses

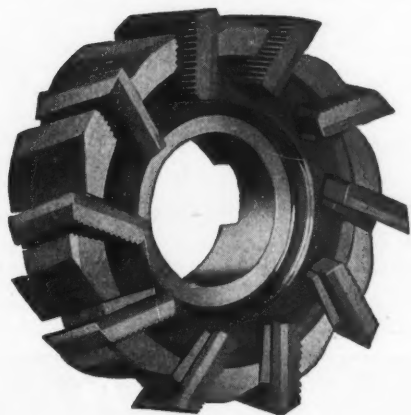
500 lbs. to 35 tons pressure

HYDRAULIC, MOTOR DRIVEN, HAND OPERATED

Greenerd Arbor Press Co., Nashua, N. H.



**OUR DESIGN IS THE RESULT OF
YOUR EXPERIENCE WITH
MILLING CUTTERS**



**The most economical ratio of adjustment of
side and peripheral cutting edges is estab-
lished by the job itself.**

That is why the adjustment of

G & G

**Inserted serrated blade milling cutters is not
limited by mechanical construction.**

GODDARD & GODDARD CO.

DETROIT, MICH.

in oil wells. All oil cups are conveniently located and a one-shot lubrication system can be furnished which will lubricate all bearings and ways, except spindle bearings, by pressure on a conveniently placed lever.

Safety is a prime factor in the design of this machine. The power can be stopped quickly by means of push buttons at the operator's fingertips. A relief valve in the hydraulic system automatically stops the feed should the work become jammed.

The machine will grind work 24 in. long, 8 in. wide and 11 in. high under

a 12-in. wheel. Removal of the dust guard affords 2 in. additional height. The table is 9½ in. wide and 46 in. long, with a working surface 6x24 in. Longitudinal movement, 26 in., and traverse, 8½ inches.

The grinding wheel is 12x¾x2½ in. hole. Longitudinal table travel, 10 to 90 ft. per minute. Traverse travel automatic, 0 to 0.175 in. per reversal of table. The hand vertical feed is graduated in 0.0005 in., spaced 5/32 in. apart. Spindle speed is 1750 r.p.m. and power is obtained through a 2 h.p., 1750 r.p.m. rolled shell motor, built integral with the spindle. A 2 h.p., 1750 r.p.m. standard motor with V-belt drive also operates the hydraulic pump. Floor space required, 44x86 in. Height overall, 62½ in. Weight, net, 3400 lbs. Standard equipment includes one grinding wheel, diamond tool holder without diamond, and wrenches. 15 gal. of oil is furnished.



DRILL THESE HOLES

By a Quick, Easy, Inexpensive Method
Your business letterhead will bring literature.

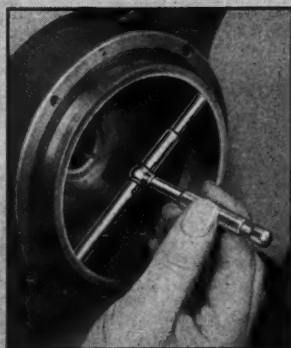
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

Walker-Turner Flexible Shaft Grinder

The ½ h.p., heavy duty, flexible shaft grinder offered by Walker-Turner Co., Inc., 727 Berckman St., Plainfield, N. J., uses a minimum of floor space yet will

LUFKIN

TAPES - RULES - PRECISION TOOLS



Another Tool popular with
mechanics- **LUFKIN**

Telescoping Gages

Note position of handle in illustration showing the Telescoping Gage in use on blanking die. Even though Gage is not fully extended, the handle is "Just where it should be," in the center of the tool. An exclusive **LUFKIN** feature.



Send for
Tool Catalog No. 7

NEW YORK:
105-110 Lafayette St.

THE LUFKIN RULE CO.
SAGINAW, MICHIGAN, U. S. A.

Canadian Factory
WINDSOR, ONE

the dust
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46 in.
x24 in.
and tra-

2 1/2 in.
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power
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without
of oil

shaft

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N. J.
et will

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7

THERE'S ONLY

*One
"Best"*



AND THAT'S OUR
NO. 84 FRAME

There's no question about it—this new frame is definitely without equal, anywhere! Its superior quality is evident the moment you see and handle it. Note its distinctive features—improved design, high finish, indestructible Tenite handle, good balance and substantial, rigid construction. It will last a lifetime and save you money on blade breakage.

This outstanding frame now comes equipped with the Blu-Mol Molybdenum blade—the blade that is being adopted by progressive shops the country over. Blu-Mol hand and power blades are economical of time, expense and effort on all types of cutting jobs.

For full details on every kind of machine shop tool, write for Catalog 41.

MILLERS FALLS COMPANY

Greenfield, Massachusetts



DOALL CONTOUR SAWING OFFERS YOU ---



SAVES SETUP

AUTOMATIC TRUE CIRCLES
To make true circles with the Contour Saw the material is revolved on a fixed pivot, turning into the saw exactly as in a lathe. No time is lost in chucking, truing up, or centering, and the unused portion is saved, instead of being reduced to chips. Contour Saws are widely used to secure automatic true circles within .002 accuracy.

LARGE CAPACITY

SAVES MATERIAL
Steady DOALL Uses
In addition to circle cutting Contour Sawing saves 30 to 75% in a wide variety of machine tool operations and production work:

- Tool making—high speed steel
- Dies and punches
- All die parts—mass operation
- Cutting non-ferrous metals
- Shaping segments for arc welded bellows and flue
- Flies and flywheels
- Trimming off gates
- Templates
- Special parts
- Precision fitting

FAST

CUTS TRUE CIRCLES INSIDE AND OUTSIDE

TRUE CIRCLES OF ANY DIAMETER AND UP TO 8" THICKNESS OF MATERIAL

QUICK SHIPMENTS
Shipments are usually made within 10 days on standard material.

LETTERS
TO
DOALL

"We are using our DOALL far more than we expected. Everything about the machine is fine."

American Can Co.
Englewood Plant, Chicago

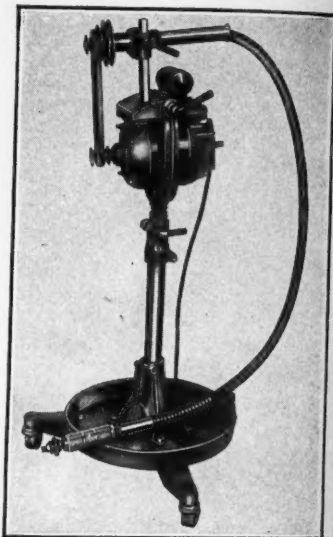
TO INVESTIGATE...

1. Ask for Application Analysis Form that helps you determine DOALL savings in your operations.
2. Send for Contour Sawing Handbook, mailed free when requested on business letterhead.



CONTINENTAL MACHINE SPECIALTIES
1301 South Washington Avenue
MINNEAPOLIS MINNESOTA

do innumerable jobs. A special telescopic column permits the shaft to be raised 15 in. The normal height is 42 in. while the full height is 57 in. The flexible shaft is 5 ft. 4½ in. long, rubber covered, with an SKF ball bearing hand piece. The motor swivels but



Walker-Turner ½ H.P. Heavy Duty Flexible Shaft Grinder

may be locked in any position. The deep base acts as a tool tray. SKF ball bearings are used throughout this inexpensive machine.

Lenney Variable Speed Transmission

Designed and built for use between the power supply and the machines or equipment where variations in speed are necessary or desirable, the Lenney Variable Speed Transmission, product of The Lenney Machine & Manufacturing Company, 733 Niles Rd., Warren, Ohio, is infinitely adjustable to a fraction of a revolution per minute, making possible any speed between its high and low limits. The speed of the transmission is adaptable to any requirement and depends upon the selection of the motor speed and the method of application to the equipment.

The running speed of the output shaft

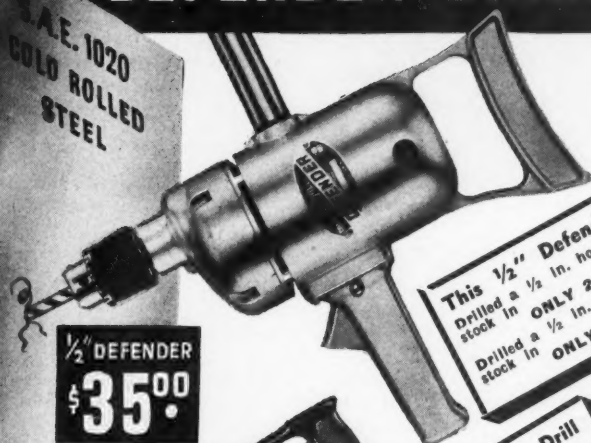
April, 1937
dial tele-
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bearing
vels but

April, 1937

MODERN MACHINE SHOP 177

HERE'S PROOF of the power and speed of SKILSAW'S new low priced DEFENDER DRILLS

S.A.E. 1020
COLD ROLLED
STEEL



This 1/2" Defender Drill
Drilled a 1/2 in. hole in 1/4 in.
stock in **ONLY 28 SECONDS!**
Drilled a 1/2 in. hole in 1/2 in.
stock in **ONLY 40 SECONDS!**



This 1/4" Defender Drill
Drilled a 1/4 in. hole in 1/4 in.
stock in **ONLY 13 SECONDS!**
Drilled a 1/4 in. hole in 1/2 in.
stock in **ONLY 22 SECONDS!**

NEVER before such performance . . . such quality construction and engineering in low priced drills! Bearings are ball and self-lubricating Oilite bronze. Motor has extra overload capacity for cool running and longer life. Special alloy-steel gears, helical cut for quiet operation. Die-cast alloy frames for strength and lightness. Compare their specifications, power and speed and you will see why DEFENDER Drills are the biggest drill "buy" on the market.

See Your Distributor and Write for Our Catalog

SKILSAW, INC.

3334 ELSTON AVE., CHICAGO
210 E. 40th St., New York — 52 Brookline
Ave., Boston — 312 Omar Ave., Los Angeles
2065 Webster St., Oakland

is indicated by a dial which is located at the top of the unit, thus the transmission can be set to predetermined speeds at any time, either before starting or while running. The speed selecting wheel is located on the side of the unit as standard, but can be changed



Lenney Variable Speed Transmission

to remote control by the use of a flexible shaft, chain, pilot motor, or other regulating means when so desired.

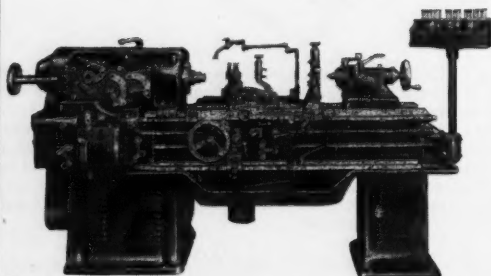
The transmission is smooth-running and is said to make no more noise than an electric motor. All moving parts are rolling contacts and, as they are perfectly balanced, there is almost entire freedom from vibration. Long life and

freedom from wear are assured by a liberal use of ball bearings and the fact that all moving parts run in a bath of oil. The transmission runs in either direction; it can be used with a reversing switch controlling the motor, or other reversing means, and the output shaft will run at the same speed in either direction. The output shaft is reversed instantly as the input shaft is reversed. In the built-in motor types, the motor is built especially for the Lenney transmission by a reliable motor manufacturer and is fully guaranteed.

The operating principle of the transmission is based upon the use of a hardened steel roller in pressure contact with an equally hardened steel driving disk to transmit power. The contact pressure of the roller against the disk is in proportion to the load imposed on the output shaft, which is accomplished with the Lenney automatic loading device. This device at all times maintains pressure of the steel contact roller against the driving disk directly in proportion to the load imposed on the output shaft.

The loading device is so constructed as to use the imposed load on the output shaft to maintain the pressure of

SIDNEY PRECISION TOOL ROOM LATHES



● New features include Quick-Change Gear Box—a separate, enclosed unit, tongued, grooved and bolted to the front of the bed. All shafts in gear box and on quadrant operating on anti-friction bearings. 48 complete thread and feed changes without the use of extra gears.

Let us send you complete details.

"Lathes and Milling Machines"

THE SIDNEY MACHINE TOOL CO.

210 HIGHLAND AVENUE

SIDNEY, OHIO



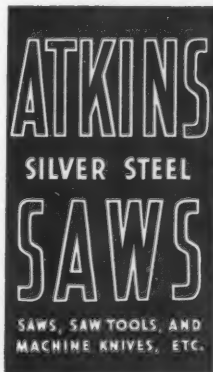
TEETH THAT BITE!

● All wild animals must fight to live. For self preservation nature equips them with sharp teeth, firmly set.

Atkins spent 80 years engineering saw teeth . . . giving them the proper set to cut wood, ferrous and non-ferrous metals, plastics or stone. Expert metallurgists developed Silver Steel . . . the finest saw steel known . . . which gives these teeth their strength and long life.

That's why Atkins Saws cut easy, fast and clean . . . That's why they give you the maximum in production with a surprising economy and a minimum of benching.

Atkins Silver Steel Saws have the "teeth that bite."



E.C. ATKINS AND COMPANY

INDIANAPOLIS, INDIANA

the contact roller against the driving disk, and as the imposed load increases or decreases, the pressure of the loading device is increased or diminished. The slightest change in the load imposed on the output shaft simultaneously increases the contact pressure so that the transmission maintains a constant output speed under all conditions. Absence of reciprocating parts in the transmission insures quietness and almost entire freedom from vibration. No vibration is imparted to machines to which the transmission is attached.

Driv-Lok Pins

To meet the need for a simple yet efficient fastening device, the Driv-Lok Company, Inc., 1525 Railroad Ave., Bridgeport, Conn., has brought out the Driv-Lok self-locking pin shown in the illustration. The Driv-Lok pin is knurled by a special process which expands the pin a few thousandths of an inch over its nominal diameter. Driving the pin into a straight drilled hole (equivalent to the nominal diameter) will therefore create a slight press fit which is maintained inside the hole through the resiliency of the material. To obtain this effect, a special drawn

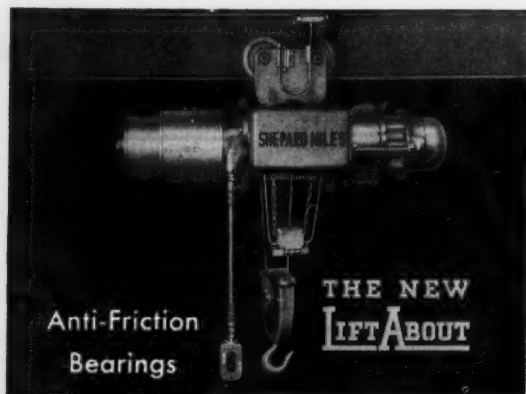
wire and a special knurled process are used. The Driv-Lok pin is made from drawn chromium vanadium steel (SAE 6150). This alloy is practically rustless under ordinary conditions, has a tensile strength of 115,000 lbs. per sq. in., and is particularly suitable for parts subjected to severe service. The pin can also, however, be made of brass, 18-8



Driv-Lok Self-Locking Pin

stainless steel, Monel metal, aluminum and many other special materials.

The Driv-Lok pin is said to be proof against shake and vibration. The pin can be removed without difficulty by using a punch, yet it need not be damaged, permitting the use of the same pin in the same application over and over. The Driv-Lok pin does not deform the hole into which it is driven. The nominal diameter of the pin is held within minus one thousandth of an inch and the length of the pin is held within plus or minus 0.005 inch.



Anti-Friction
Bearings
Throughout

Write for
Bulletin
No. 126

THE NEW
LIFTABOUT

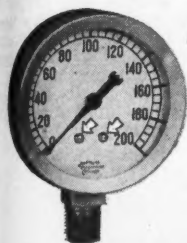
THE
MODERN
ELECTRIC
HOIST

SHEPARD NILES
CRANE & HOIST CORP.

SCHUYLER AVENUE, MONTAUR FALLS, N. Y.

A COMPLETE LINE OF CRANES AND HOISTS

A skilful designer and 2 Self-tapping Screws effect— AN ASSEMBLY SHORT-CUT SAVING TEN OPERATIONS



Even if your product is small and "simple" like this gauge... it will pay to go over its assembly with a **PARKER-KALON ASSEMBLY ENGINEER**

No matter what the product, or how many fastenings are involved, it certainly pays to have a good "working knowledge" of Parker-Kalon Hardened Self-tapping Screws. The Jas. P. Marsh Corporation, Chicago, makers of the gauge shown here, gladly testify to that fact. For knowledge of the possibilities offered by these unique Screws enabled them to develop a simple new gauge design and assembly method which not only effected a notable economy, but also produced a better product.

By using two Type "U" Parker-Kalon Self-tapping Screws they now completely assemble the dial and gauge movement to the socket of the instrument. And their present routine produces a more rugged and accurate assembly than they had been able to achieve by a dozen operations formerly. The many individual hand assembly operations and all of the tapping work once required, have been eliminated. In addition, piece work is possible; number and speed of operations can be controlled; accurate costs are obtainable; a higher production rate is secured; better work is done.



NOW - 2 simple operations!

To complete the assembly of dial and gauge movement to the socket, the maker merely hammers 2 Type "U" Parker-Kalon Hardened Self-tapping Screws into drilled holes.

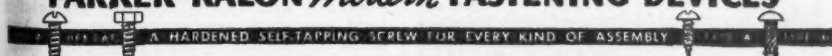
BEFORE - it took a dozen

Before adopting a new design and assembly method, it was necessary to tap six or seven holes to fasten the movement, tube socket, and dial to the casing with machine screws. Many individual hand operations, as well as tapping, made this method costly and time consuming.

Makers of all kinds of products involving assembly of metal or plastics will testify to equal and greater benefits. Are you taking full advantage of it? Why not make sure by going over your assemblies with a Parker-Kalon Assembly Engineer. He will point out where and how you could benefit by applying Self-tapping Screws, and provide you with a "working knowledge" of them. Your request will bring him.

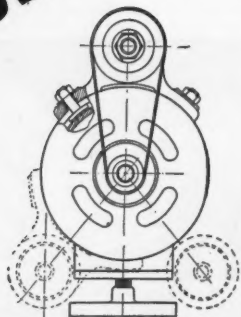
PARKER-KALON CORPORATION
Dept. M, 198 Varick Street, New York, N. Y.

PARKER-KALON *Modern* FASTENING DEVICES



SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS

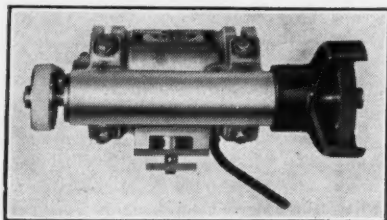
SWING IT!



with your **NEW**

THE MAC

THE PRECISION GRINDER
with Circumferentially
adjustable Spindles



FITS ANY SIZE LATHE

Short Belts eliminate centrifugal slap and tendency to vibrate.

Speeds from 7000 to 36000 R.P.M.

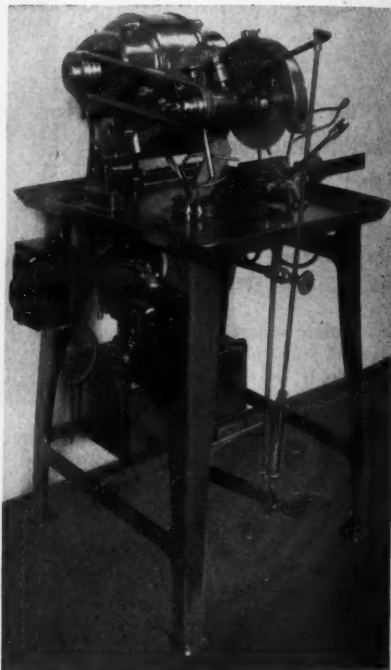
Write for catalog.

THE MCGONEGAL MFG. CO.

JONES BUILDING
EAST RUTHERFORD NEW JERSEY

Radiac Type G Cut-Off Machine

The illustration shows the Type G Radiac Cut-Off Machine which has been designed especially for the efficient cutting of the smaller sizes of bar and tube stock where the wet cutting method is indicated and where the finish produced by the wet method is desirable. The machine is being marketed by A. P.



Radiac Type G Cut-Off Machine

DeSano & Son, Inc., 1621 McKean St., Philadelphia, Pa.

The cutting agent is an abrasive disk which cuts the stock with a minimum of waste, leaves a minimum of burr, and produces a smooth, clean cut. The machine will cut $\frac{3}{4}$ -in. solid metal or $1\frac{1}{4}$ -in. tubing on production work, or up to $1\frac{1}{2}$ -in. diameter solid metal for laboratory work.

The horizontal work clamp, which is intended for straight cuts only, is hand operated and quick acting. Material is held securely under tension on both sides of the cut by two equalizing clamp fingers. The operator uses the hand

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OHIO MAN *Wins Prize!*

Five dollars goes to Mr. O. J. Heimann, Urbana, Ohio, for the prize-winning shop hint reproduced on this page. It's a kink that many shops will find useful, and we hope Mr. Heimann will come through with some more just as worth-while.

Have you tried your hand at a "Shop Hint" for this page? It's easy to win a \$5.00 prize—every shop man knows a few clever short cuts—ways of getting a job out better or quicker. What's yours? Sit down now and write it out briefly—a post card will do. Mail to The Fafnir Bearing Company, Care "Shop Hints," New Britain, Conn.

Send as many "Shop Hints" as you wish, as often as you wish. But we assume no obligation to return "Shop Hints" that do not win prizes, or to enter into correspondence about them.

TO PUT
A GRINDER-LIKE
FINISH
ON LATHE WORK

*This Month's
Prize Winner*

Mr. Heimann says, "Take a worn-out milled file, brush clean, cover with oil, then take a flat oilstone and hone the teeth flat. The file becomes useless for filing, but used on lathe work will give a grinder-like finish, the radius of the work providing the necessary clearance." Try this hint in your shop!



PRIZE WINNING HINT FOR MAKING OLD MOTORS NEW

Fafnir should get a prize for this Ball Bearing Motor Cartridge—it

makes an easy job of salvaging old motors—making them as good as new; of converting plain bearing motors into the friction-free ball-bearing type.

Mounting is simple—no shaft shoulders,

threading, lock nuts, or adjustments are necessary. Merely bore out the end bell and bolt or weld the cartridge to it.

Furnished complete with famous Fafnir Wide Inner Ring Ball Bearing, self-locking collar and integral seals. For shafts $1\frac{3}{16}$ " to $3\frac{1}{2}$ " in diameter, inclusive. Send for descriptive literature. The Fafnir Bearing Company, New Britain, Conn. Branches in principal cities.

FAFNIR BALL BEARINGS

THE BALANCED LINE—MOST COMPLETE IN AMERICA

lever only to release the tension after the cut has been made. A coolant pump, five gallon storage tank, and a special table for the collection and drainage of the coolant are built in as an integral part of the Type G machine. During the cutting operation a continuous stream of coolant flushes both the cut-off disk and the material, allowing no opportunity for overheating.

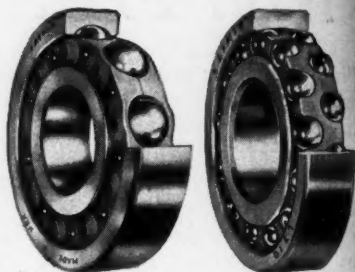
The spindle is ball bearing and operates at 2000 r.p.m. Lubrication is oil splash with sight feed oil cup. The abrasive disk can be 10x1/16 in., 10x3/32 in. or 10x1/8 in. The capacity of the coolant system is five gallons, and the pump is driven direct by a 1/4 h.p. motor. Electrical equipment includes a 1 1/2 h.p. motor, 1800 r.p.m., splash-proof, fan-cooled and ball bearing. A starting button with push button control and overload protection is standard equipment. Net weight, 355 pounds.

Fafnir Heavy Duty Ball Bearings

To meet the severe problems of shock loads, vibration and wear coincident with the operation of heavy duty machinery, The Fafnir Bearing Company, New Britain, Conn., has recently added a new series of high capacity ball bear-

ings to its present extensive range of types and sizes of bearings.

Using as a basis the ever-popular Single Row Radial design, the new bearings are furnished in the Heavy Duty

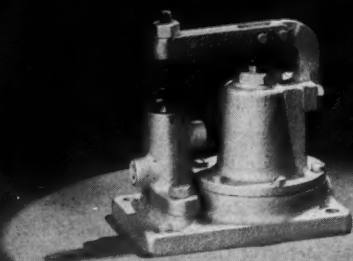


Fafnir Heavy Duty Ball Bearings

Series but with specially designed, sturdy, wear-resistant, bronze retainers to take care of these extra-duty requirements. Rugged, dependable, and accurately fabricated so that they will be exactly balanced in operation, they fulfill all demands imposed by this type of equipment.

A folder entitled "Endurance" has

RC-II



Low Pressure Stop Valve

one of the various types of control units in

"T-J" AIR OPERATED REMOTE CONTROL SYSTEMS

- FOR COMPRESSED AIR CONTROLS FOR ANY MACHINE
- FOR THE SAFE OPERATION OF PRESSES

The valve shown operates the main valve to accomplish the reverse stroke of the cylinder, should the pressure drop to a predetermined low point. May we send you our Bulletin No. 3 which describes these systems in detail?

THE TOMKINS-JOHNSON CO.

620-N. MECHANIC STREET

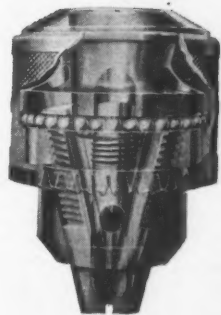
JACKSON, MICHIGAN

from TOOLS to WHEELS



Jacobs

Through the hundreds of operations necessary to bring the finished car rolling off the line—tool holding is a constant factor. Whether it be a complicated set-up on a multi-spindle machine or the simple work of a portable drill—Jacobs Chucks are the 10 to 1 tool holding favorite.



Illustrated is the Jacobs Ball Bearing Super Chuck—the last word in chuck engineering. All parts ground. Accurate. Fast, easy tool changes. New key with super-leverage.

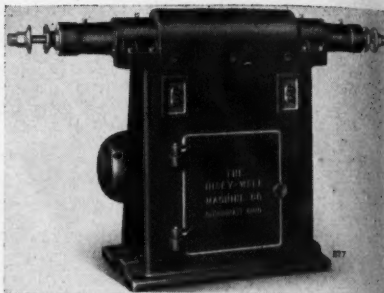


THE JACOBS MANUFACTURING COMPANY
HARTFORD CONNECTICUT, U. S. A.

just been published by The Fafnir Bearing Company, which tells of the development of this new line of bearings. It describes the new bearings with bronze retainers as well as other standard and special ball bearings suited to severe service uses.

Hisey Texdrive Buffing and Polishing Machine

The Hisey-Wolf Machine Company, 2745 Colerain Ave., Cincinnati, Ohio, has developed a new line of buffing and polishing machines in several sizes from 3 to 25 h.p. The machines are designed for external mounting of the motor, and will accommodate any make or type of motor. The attendant interference of the motor from the top of the pedestal and providing any and all speeds for any size or kind of wheel, regardless of the electric current available, are two outstanding advantages which are made possible by the use of V-belt drive. Other advantages are greater flexibility, quick speed changes, the use of any stock power motor, simple substitution of a larger or smaller motor, or one of different current characteristics to meet changed conditions, and a general refinement of construction details.

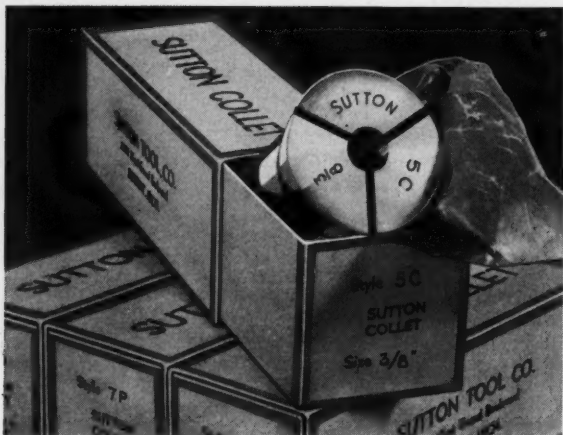


Hisey Texdrive Buffing and Polishing Machine

Spindles are of one-piece construction, made in special spindle steel, and heat treated when necessary. All Hisey Texdrive Buffing and Polishing Machines are equipped with high-grade oversize ball bearings mounted in closest proximity to the wheels. Each inner race is securely locked individually on the shaft with the use of sleeves or bushings. They are provided with labyrinth seals to exclude dust and grit.

Each bearing has a filler, oil-level and

SUTTON COLLETS *for*



**Lathes and
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Spring tempered
to give long and accurate
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Threads chased
to uniform size with single-
point tool

Precision ground
inside and out on hard-
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Made by the developers of Sutton DIAMOND-GRIP Collets for screw machines. Send for circular of SUTTON COLLETS for all makes of lathes and milling machines.

SUTTON TOOL CO. 2838 W. Grand Blvd.
Detroit, Michigan

INGERSOLL ZEE LOCK Face Mills

No. 21—Medium Duty. For finishing operations. (Cuts up to $\frac{1}{4}$ " in depth).

No. 21-XX—Extra heavy Duty. For heavy roughing operations. (Heaviest roughing cuts).

No. 21-X—Heavy Duty. For general purpose roughing or finishing (Cuts up to $\frac{1}{2}$ " in depth).

USES THE POSITIVELY LOCKED DOUBLE ADJUSTABLE INGERSOLL ZEE LOCK CUTTER BLADE OF HIGH SPEED STEEL, SUPER-HIGH SPEED STEEL, STELLITE OR CEMENTED CARBIDE. The cutter is complete in itself. No additional parts are required when resetting. The cutter blade resets mostly outward in the major direction of wear and slightly forward on its face. It is easily reset as the serrations and wedges automatically reset the blade without any additional devices. The Ingersoll Milling Machine Co., Rockford, Ill., U.S.A.



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FRANKENMUTH, MICH.



drain. Oil chambers are of liberal size requiring minimum attention. Bearing housings have full length keyway at the top of the column, assuring perfect and permanent alignment. Spindles and bearing housings are removable as an integral unit without disturbing bearings. The machines are made with either one or two spindles and with single or double motor drive respectively.

McCrosky Jack-Lock Milling Cutters with Tungsten Carbide Tipped Blades

The Jack-Lock Wedge developed by McCrosky Tool Corporation, Meadville, Pa., for locking serrated blades in a tool body has now been incorporated



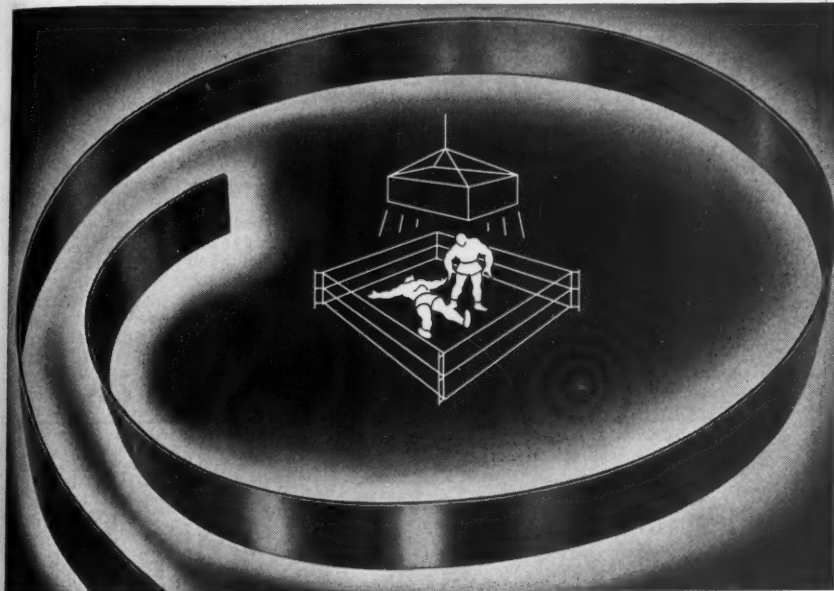
McCrosky Jack-Lock Milling Cutters with Tungsten Carbide Tipped Blades

in a line of McCrosky shell end mills and face milling cutters especially designed for use with tungsten carbide tipped blades.

The Jack-Lock Wedge is said to provide features that have proved particularly suitable for tungsten carbide applications. It is semicircular in cross section and occupies the semi-circular recess in the cutter body. Tightening the socket set screw in the wedge lifts the wedge like a jack, forcing it over against the blade with a powerful compound wedging action that provides the

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WINS ENDURANCE CONTESTS!



IT'S ROEBLING Cold Rolled High Carbon Steel Flat Wire...tempered, polished, and blued...made up especially to meet extremely severe service requirements. Used for control mechanism of certain continuously operated machines...it is "on the job" hour after hour...day after day.

This Roebling wire is used because it assures maximum protection against breaks. It has high fatigue-resistance... great flexibility and resiliency... uniform high quality.

This wire is a typical example of the wide variety of cold rolled steel flat wire, high and low carbon, which we make for a large number of discriminating buyers of this product. Roebling Flat Wire is produced to meet a wide range of severe requirements as to temper, pliability, dimensions, strength, forming qualities, etc.

Let us send you samples. We would welcome an opportunity to place at your service our specialized experience of over 40 years.



Roebling Cold Rolled Flat Wire is made from both high carbon and low carbon steels, produced in Roebling's own mills. The high carbon flat wire is available in tempered and untempered types.

Finishes:—bright, black annealed, bright annealed, tinned, japanned, galvanized, blued, straw-colored, coppered.

JOHN A. ROEBLING'S SONS COMPANY
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ROEBLING Cold Rolled Steel FLAT WIRE

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

rigid support and freedom from vibration essential to the proper performance of tungsten carbide. The Jack-Lock Wedge is also said to offer further protection to the tungsten carbide tip because it can be unlocked and relocked without hammering when the blades have to be adjusted.

As shown in the accompanying illustration, the cutter body is of the cone type, so designed as to give full support behind the tipped blade and ample clearance in front of the cutting edge. The blades are set at proper shear and rack angles for tungsten carbide. Serrations on the blades are horizontal and parallel to the bottom. The blades can be adjusted to compensate for wear in two ways, by moving them forward or by stepping them out from serration to serration.

The McCrosky design incorporates still another feature that permits economical use of the tungsten carbide tip. Behind each blade is an adjustment screw that engages threads in both walls of the blade slot and bears against the back of the blade. It is said to assist in securing a fine and accurate forward adjustment. It also permits each blade

to be adjusted independently of the others, thus allowing a blade with a chipped tip to be reclaimed without sacrificing the tip material of the other blades in the set.

McCrosky Jack-Lock Shell End Mills with tungsten carbide tipped blades are furnished in diameters from 3 to 8 in., medium duty face mills from 7 to 20 in., and heavy duty face mills from 7 to 20 in. Standard blades with a variety of tip sizes permit the selection of the tip most suitable and economical for a definite job.

Felt Collet Pads

The Modern Collet & Machine Company, Ecorse, Mich., now offers a distinct advantage in increased screw machine efficiency and economy with felt filler pads furnished as standard with all collets manufactured by this company. The felt filler pads, inserted in the slots of the collet, are said to keep all oil, dirt and chips from being carried inside the spindle. This permits more efficient operation of the collet and its associated moving parts since

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Positive Drive . . . Resilient Flexibility . . . Protection Against Misalignment . . . Free End Floater . . . Dependability . . . you get them all with Ajax Flexible Couplings. Call in your Ajax man or write for Ajax Data Book.

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STACKBIN sections eliminate the cost of stockroom construction—any workman can quickly build, change or move a stockroom. No money paid to carpenters—no time wasted using tools. Temporary stockrooms can be set up anywhere in your plant.



STACKBIN Storage Is CONVENIENT Storage

These strong steel sections nest together to form a storage unit of any size or shape. Parts and materials are always visible—always accessible. The hopper front and perfectly smooth interior speed up handling—eliminate loss of parts.

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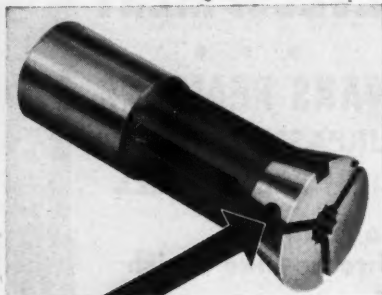
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**EVANS
FLEXIBLE REAMER CORP.**
3656 Lincoln Ave., Chicago, Ill.



the handicap of dirt and grit is eliminated.

When changing jobs, the removal of the collet is unhampered by dirt and chips which often are packed tightly inside the spindle. These pads are said to save cutting oil, especially when a



Felt Collet Pads

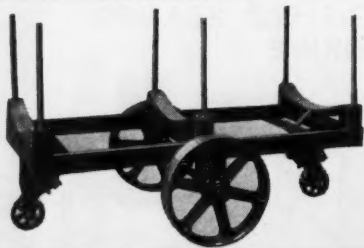
job necessitates the direction of a stream of oil directly toward the collet as the pad prevents the oil from passing through the collet and collet tube and out of the back end of the spindle where it is sprayed to the floor. The

floor around the machine is kept cleaner and collet operations are improved.

G-E Rotating-Cam Switches

A line of rotating-cam switches, designed especially for built-in control applications and adaptable to a variety of electrical functions and machine requirements, has recently been placed on the market by the General Electric Company, Schenectady, N. Y. For non-built-in applications, the devices are available as standard switches without the flanges used for flush-mounting on machines. Designated as G-E "CR 3300" rotating-cam switches, the new line is manufactured in a number of electrical and mechanical modifications, thus making it adaptable to applications varying from machine tool motor control to steel mill master switching.

Two sizes are available, the Size O with a rated 15 amperes continuous, and Size 1 with a rated 25 amperes continuous, both for 600 volts or less on A.C. current. Four standard sizes are available for controlling purposes; the single-speed motors for reversing application; the two-speed separate winding motors for non-reversing application, or for one speed forward and one speed



Designed for handling steel ties, angles, bars and pipe . . . This Service-engineered Truck will take long overhanging loads ranging up to 3,000 pounds on a single trip. The running-gear is ball bearing and Timken bearing equipped . . . insulated against heat and dust. Maneuvered with surprising ease under any load. You'll find it profitable to get full details on the time-saving, cost-lowering possibilities of this Service Truck for steel handling. Write today.

Takes
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PER TRIP!

SERVICE CASTER & TRUCK CO.
596 N. Brownwood Ave., Albion, Mich.

CANEDY-OTTO

20" Sliding Head Motor Driven Drill For Production or Precision Drilling

Here's another rugged and well-balanced Canedy-Otto Drill—precision built from the ground up to give fast, accurate drilling. Vertical Motor Drive provides simplified construction. Driving units are completely equipped with Timken Roller Bearings, the motor and motor cone pulley with ball bearings, and the spindle cone with roller bearings.

Drills are equipped with push button control and magnetic switch. Desired belt tension is easily obtained with convenient, simple arrangement. Self feed is accurate and powerful. Four changes of feed can be had while drill is operating. Capacity for $\frac{7}{8}$ " drills without back gear— $1\frac{1}{4}$ " with back gear.

Furnished in single, two, three and four spindle type— $15\frac{3}{4}$ " center distance of spindles.

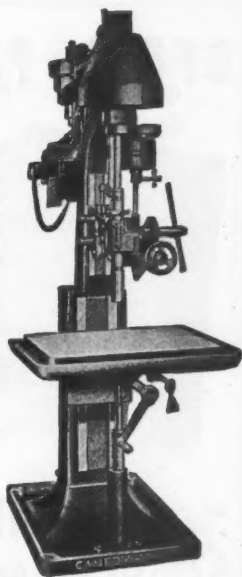
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Draftsmen can do better work faster and with less fatigue when they are equipped with Hamilton Auto-Shift drawing and reference tables. That means increased production at less cost to management . . . a possibility worth investigation. Return the coupon today.

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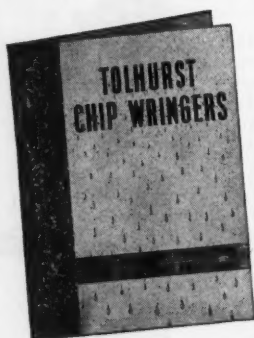
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Write for this new brochure . . . it's free . . . find out how machine shops and the country's leading manufacturers are reclaiming up to 97% of cutting oil on chips with Tolhurst Centrifugal Chip Wringers. Find out, too, how these manufacturers are reducing tool wear, obtaining more uniform production and reducing costs through Chip Wringer installations. Write, for bulletin CW-37.

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Centrifugal Division

American Machine and Metals, Inc.

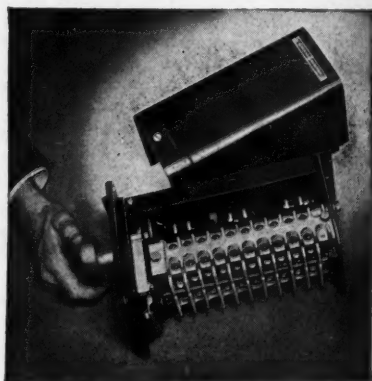
100 SIXTH AVENUE

NEW YORK,

N. Y.

reverse; the two-speed single winding motors for non-reversing application, or for one speed forward and one speed reverse; and the three or four-speed motors for three or four speeds forward and one speed reverse. In addition, special sequences are available and forms of switches with off-position contacts are also available. The switches can also be used as circuit-transfer switches.

The flanges available for flush-mounting make it possible for the switches to be built-in merely by providing an opening and drilling in the face of the machine. Since each switch is completely enclosed in a steel housing, even when

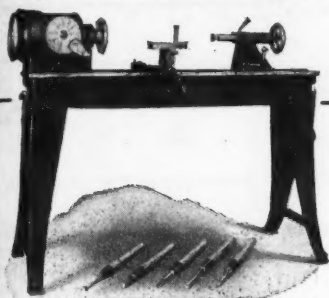


G-E Rotating-Cam Switch

mounted entirely within a machine, the operator is safeguarded, and the possibility of failure due to the accumulation of dirt on the switch is minimized. For service when the switches are subjected to a large amount of non-explosive dust, dust-tight covers having felt gaskets riveted around the edges can be attached.

The mechanism of the reversing types of the CR 3300 line provides spring return to the "off" position as long as a screw is left in the pointer, but removing this screw permits the switch to remain in the running positions. The terminals are designed to take wire sizes in accordance with the National Electric Code, thus installation time is saved. A new type of terminal is used on the Size 1 switch. The latter terminal consists of a slotted stud at one end of a post which has a stationary contact on the opposite end. This post extends through a heavy molded-asbestos-compound terminal board. The connecting wire is inserted in the stud slot

AMAZING---how smoothly this Lathe with its extra heavy bearings spins sheet metals!



Has strong rigid bed and extra heavy bearings to stand tremendous leverage. Live tail center, adjustable tool rest. Ball or roller bearing headstock. Several capacities. Also supplied with motor-belt-drive. Excellent for metal and wood turning. Write for all the facts.

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Why Use A Shaper to cut Keyways when a

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will do the job so much quicker and better?

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ROCHESTER, N. Y.

"BLACK DIAMOND"



**NO ADJUSTMENT
NECESSARY ON DRILLS
No. 60 TO 1/2"**

"Black Diamond" Precision Grinders are the only machines that give precision grinding on any size drill from No. 60 to 1/2" without complicated adjustments. The money you save on proper drill grinding with a "Black Diamond" will quickly pay for the cost of the machine.

Write for Bulletin No. 115.

BLACK DIAMOND

SAW & MACHINE WORKS, INC.
45 North Ave.

Natick, Mass.

and is held there by a square washer and hexagon nut which assure good connection and prevent the terminal from becoming loose due to vibration. The terminals for the Size O switch are of the standard binding screw type.

The large, double-break, self-aligning, fine silver contacts used are of the bridging-bar type, which eliminate shunts and shunt maintenance. On the Size 1 switch, the contacts are opened and closed entirely by cams. The Size O switch is cam-operated in one direction and spring-operated in the other.

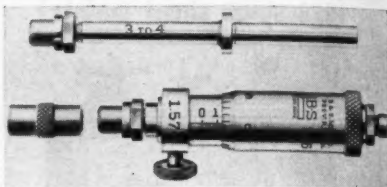
As a safeguard against single-phase operation, both sizes of the switch for either a cam or a pawl to assure positive positioning and to prevent leaving the switch in partial contact.

Brown & Sharpe Inside Micrometers

The Brown & Sharpe Mfg. Co., Providence, R. I., has recently announced two inside micrometers to be known as Nos. 266 and 267. These micrometers are said to be handy, compact, and reliable. No. 266 measures from 2 in. to 8 in. by thousandths of an inch and No. 267 from 2 in. to 12 inches.

A desirable feature is an adjustment

point and lock nut on the thimble. The wear on one point is many times the wear on the point of the several individual rods, and in this design, if



Brown & Sharpe Inside Micrometer No. 266

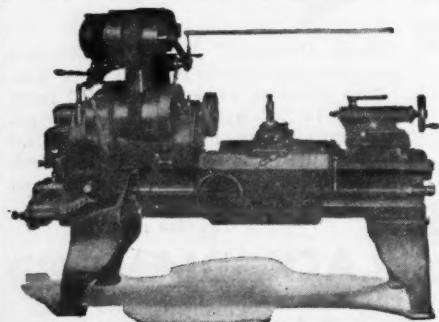
wear should ever occur it is only necessary to adjust one measuring point to the fixed distance, which is stamped on the tool. It is not necessary to adjust all of the individual rods.

Hartford "Super-Spacer"

A tool which is said to fill a long-felt want in modern machine shop and tool room practice consists in the "Super-Spacer" which has been brought out by The Hartford Special Machinery Co., Hartford, Conn. The lack of rigid-

MODERNIZE . . .

. . . your Lathes, Milling Machines, Shapers and other cone pulley Machines with Cullman Individual Drives.



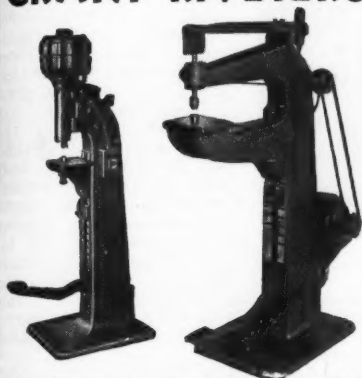
Made in sizes for motors $\frac{1}{2}$ to $7\frac{1}{2}$ H. P. Sold subject to your approval.

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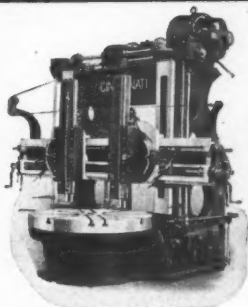
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THE GRANT MFG. & MACHINE CO.
96 Silliman Avenue Bridgeport, Conn.



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VERTICAL BORING MILLS
PLANERS, Double Housing,
Openside
CRANK PLANERS
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THE CINCINNATI PLANNER CO.
CINCINNATI OHIO

New 6" x 6" Peerless Improved High Duty Metal Sawing Machine With Hydraulically Operated Automatic Bar Feed

Automatically feeds the bar of stock forward to the gauge, automatically closes the vise, and automatically continues to repeat the complete cycle of cutting until the entire bar is cut to the length the gauge is set for, all without the attention of an operator.

The three speed sliding gear transmission—crankshaft—balance lever and trunnion blocks are fully ball bearing equipped. The fastest cutting time possible at a minimum blade cost on any kind of metal because of its modern design and rigid construction.

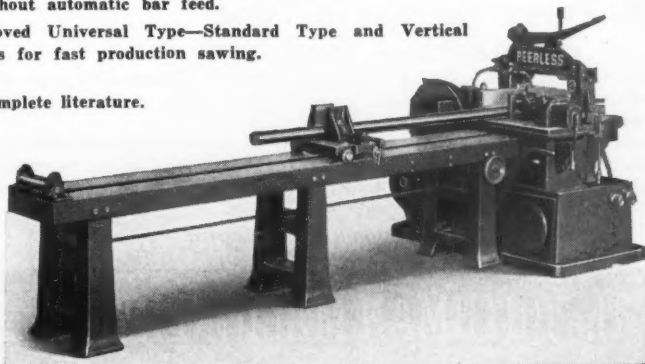
Also furnished without automatic bar feed.

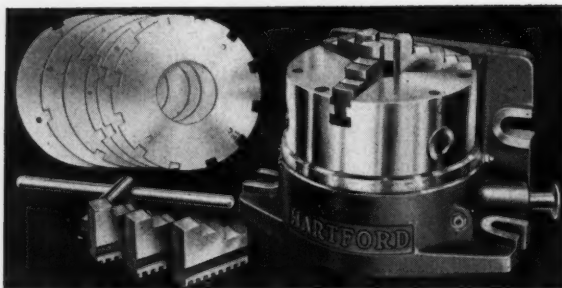
Also—Peerless Improved Universal Type—Standard Type and Vertical Type in various sizes for fast production sawing.

Write for complete literature.

**PEERLESS
MACHINE
COMPANY**

**RACINE,
WISCONSIN**





Hartford "Super-Spacer"

ity of some dividing heads, when the chuck is mounted, and especially in the vertical position, presents a problem which has been augmented by the advent of modern machine tool speeds and feeds.

In operation, the Super-Spacer holds the work in a standard chuck of either universal or independent type in either a horizontal or vertical plane. By means of a master index plate with 24 accurately spaced notches, and of the divisions 2, 3, 4, 6, 8, 12 or 24 are obtainable. It is readily and quickly changed

from one set of divisions to another by means of mask plates notched with the desired number of spaces. It is impossible to engage any index notch except those left clear by the mask plate.

The body of the tool is of standard steel. The flanged turret is ground to fit the chuck body and is easily rotated when the clamp handle is released. A floating clamp binds on the tapered index ring which, in turn, is screwed and doweled to the flanged turret. This clamping action seats the turret securely on the base. Adjustment is provided for wear.

The face of the chuck is ground flat and square to permit mounting of fixtures of work-holding devices. Graduations are provided for use when setting for odd spaces. A locking plunger engages both master index plate and mask plate. The overall length of the Super-Spacer is $12\frac{1}{2}$ in.; overall width is 9 in., and the overall height is $7\frac{3}{4}$ in. Weight, 83 pounds.

"G U S H E R" Coolant Pumps

A Pump for Every Type of Machine Tool

The Ruthman Machinery Company offers a COMPLETE line of modern coolant pumps—designed to meet every modern cutting need.

Low power consumption—elimination of packing glands—automatic priming feature—use of centrifugal force—these features and many more make RUTHMAN Gusher Pumps economical necessities for your shop.

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The RUTHMAN MACHINERY CO. 538 East Front St. Cincinnati, Ohio

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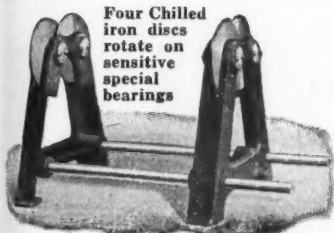
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No Leveling Required

A simple and excellent device for balancing, straightening and truing.

They are made in the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

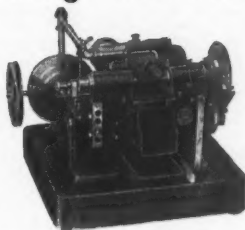


Four Chilled iron discs rotate on sensitive special bearings

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Made by **Anderson Bros. Mfg. Co.**
1926 Kishwaukee St., Rockford, Ill.

"Waltham" Pinion Cutting Machines



FAST AND ACCURATE

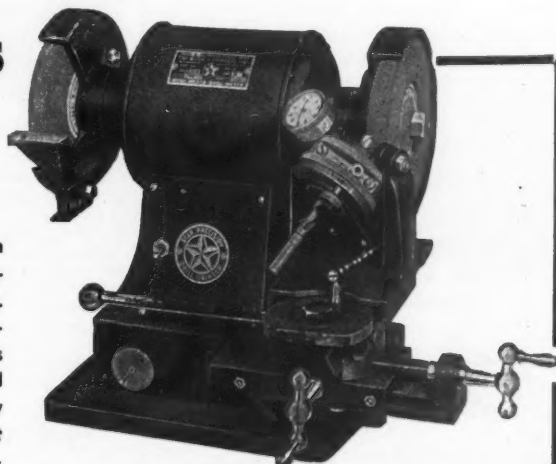
Operator can attend to several machines. For small pinions, a magazine feed not shown in the cut allows the machine to run without stopping, materially increasing the production. One, two, or three cuts, according to the nature of the work, may be made.

WALTHAM MACHINE WORKS
WALTHAM, MASS.

-Grinds 81 SIZES OF Drills

No. 31 to 1/2"

This Star Precision Grinder puts drill grinding on a production basis. Its simplicity and accuracy saves as high as 50% on drill costs and insures uniform accuracy that guarantees perfect holes and increases production.



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Division of Star Electric Motor Co.

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• Reputations are priceless—safeguard the reputation of your products by specifying HY-TEN and ECONOMO Steels—

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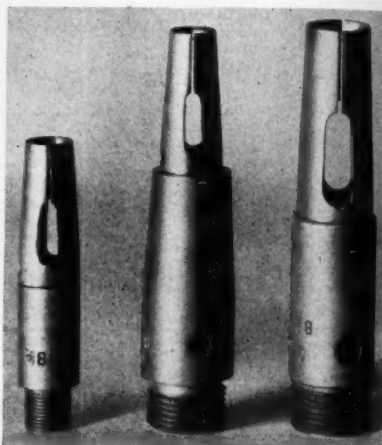
Cleveland, Chicago,
Newark, Detroit, Buffalo

H & G Type K Feed Fingers

A line of feed fingers for feeding stock on automatic screw machines, known as Type K, has been developed by the Eastern Machine Screw Corporation, New Haven, Connecticut.

These fingers have interesting features of design whereby the same finger can be used on many different makes and sizes of machines.

The fingers themselves are designed and proportioned for the size of stock they are to feed rather than for the



H & G Type K Feed Fingers

size of machine. This assures uniform gripping pressure.

Inexpensive adapters are provided to fit the different sizes and makes of feed tubes and give the proper overall length for each machine.

The following advantages are claimed: Uniform gripping pressure, lower finger cost and a greatly simplified feed finger inventory.

A new bulletin describing these fingers is available on request.

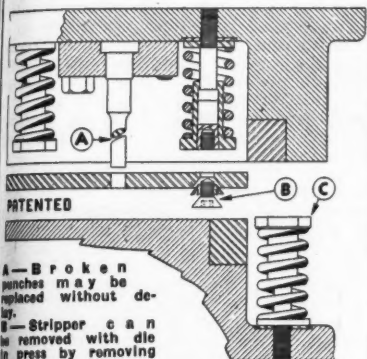
Filter Attachment for "Alnor" Velometer

A filter attachment for the Alnor Velometer has been brought out by the Illinois Testing Laboratories, Inc., 146 W. Austin Ave., Chicago, Ill. The filter attachment has been developed so that the velometer can be used in dusty atmospheres which would ordinarily have

April, 1937
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STRIPPIT

The most dependable and economical stripping device made.



A—Broken punches may be replaced without delay.

B—Stripper can be removed with die in press by removing screws.

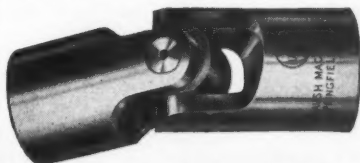
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Also Wales Adjustable Hole Punching Dies

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THE VINCO ANGLE TANGENT TO RADIUS DRESSER

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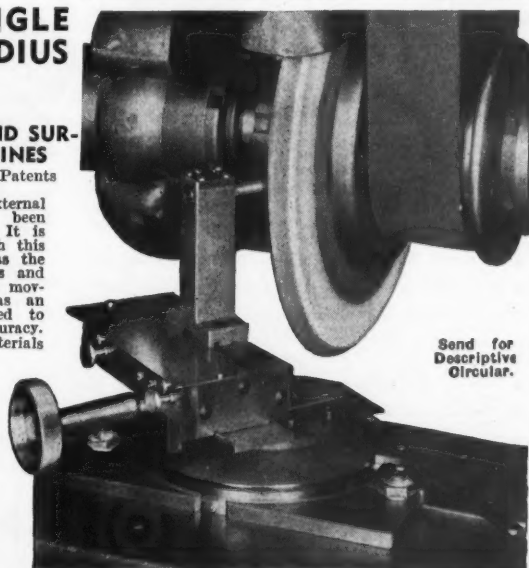
INTERNAL, EXTERNAL AND SURFACE GRINDING MACHINES

Patented June 5, 1934, Other Patents Pending.

This shows a Brown & Sharpe External Grinder and a wheel that has been dressed with the Vinco Dresser. It is easy to dress angles and radii with this precision made tool. First, it has the patented feature of dressing angles and radii from the same axis without moving the diamond. Second, it has an index plate and vernier graduated to one ten thousands of an inch accuracy. Third, it is made of the finest materials by the most highly skilled mechanics in the world. Fourth, it is guaranteed by a firm with fifteen years experience in designing and building precision grinding equipment. Fifth, scores of manufacturers are saving 75% in dressing costs and maintain an accuracy in their product that cannot be obtained by any other method.

Vinco Tool Company

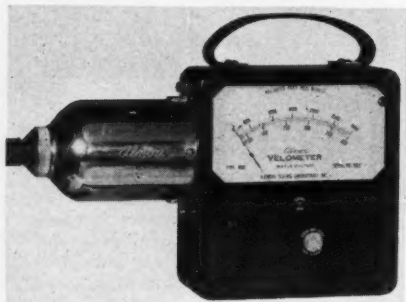
7954 Central Ave. Detroit, Mich.



Send for Descriptive Circular.

a detrimental effect upon the movement of the instrument.

The instrument can be scaled for direct reading with the filter attached and a conversion chart is provided when



Filter Attachment for "Alnor" Velometer

readings are desired without the filter attached. The filter attachment can be used either with or without the tube; the tube fitting and jets depend upon velocity range and the requirements.

Pipe Threading Eliminated by Dresser Fittings

"Time out" for cutting pipe to exact lengths, threading, grooving, flaring, or screwing up joints in cramped quarters, is no longer necessary, according to an announcement from the S. R. Dresser Manufacturing Company, 622 Fisher Ave., Bradford, Pa. With the standard line of Dresser Style 65 Fittings it is said that nothing but an ordinary wrench is needed to complete a joint in a few moments.

After inserting the plain-end pipe into the fitting (which comes completely assembled), it is only necessary to tighten two threaded octagonal follower nuts with a few quick turns of the wrench. As this is done, resilient "armored" gaskets at each end of the fitting are compressed tightly around the pipe, forming a positive seal. The resultant joint, Dresser engineers point out, is not only permanently tight but absorbs normal vibration, expansion and contraction movement, and permits deflections of the pipe in the joint. If the pipe is already threaded, it can be joined in the same way.

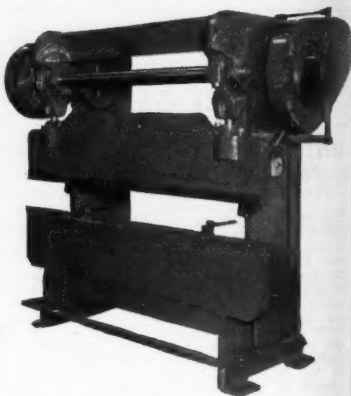
The complete line of Style 65 Fittings includes: standard and extra-long coup-

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CAPACITY—STAMINA—PERFORMANCE

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● Designed especially for use in the sheet metal industry, and capable of sustained production, have the following advanced features incorporated in them.

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- Heavy wallled renewable bronze bushings in all bearings.
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- Internal gear tooth drive friction clutch with self-releasing brake.
- Alemite lubrication to all bearings.
- Complete "V" belt motor drive arrangement, with motor and starter is furnished as standard equipment.



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From $\frac{1}{8}$ to 5 H. P.

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- Positive Drive.
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COMPLETE
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"Stroke" Sander
Including $\frac{1}{2}$ H.P.,
1750 R.P.M. Motor

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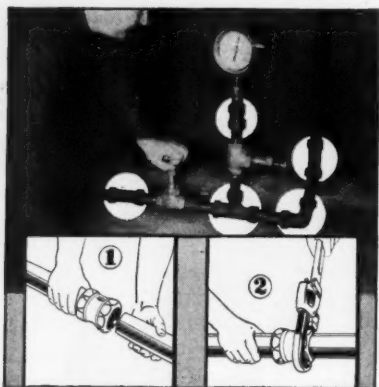
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lings, ells (both 45 deg. and 90 deg.), and tees, all supplied in standard steel pipe sizes from $\frac{1}{2}$ -in. I.D. to 2-in. I.D.,



Only one tool—a wrench—is needed to make joints with Dresser Style 65 Fittings. The simplicity of installation is illustrated above.

inclusive, black or galvanized.

These fittings are recommended by

the manufacturer for simplifying joint-making and repair work on both inside and outside piping, for oil, gas, water, air, or other industrial lines. The basic principle is essentially the same as that used in other styles of the well-known Dresser Coupling.

"Unshako" Self-Locking Nut

A lock nut, the feature of which is that the locking ring in a standard thread nut grips the bolt, has been brought out by Standard Pressed Steel Co., P. O. Box 566, Jenkintown, Pa.

One thread of the nut is machined a little below the thread root to form a hollow triangle with the space between two threads on the bolt. This space is filled by a spring steel ring, one end of which enters a radial hole in the nut so that the ring and the nut turn together. The free end of the ring terminates in the triangular space just short of a complete circle and the ring is positioned so that the anchored end leads



"Unshako"
Self-Locking
Nut

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Tool protected
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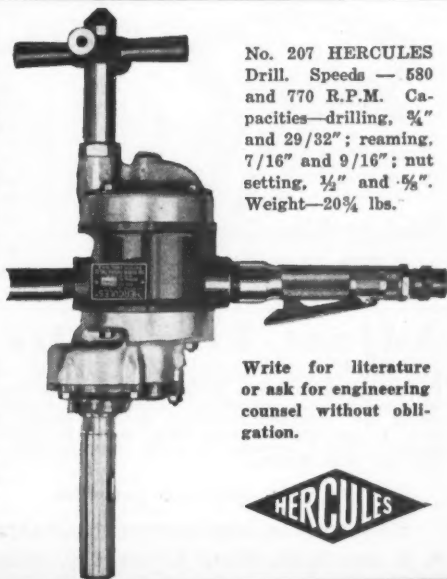
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for DRILLING and REAMING

A splendid heavy duty general purpose pneumatic drill, reamer, stud and nut setter. Screw feed—safety throttle—dead handle—Morse Taper Socket—with Spade Handle and Jacobs Chuck optional. Surplus power and high torque. Popular in automobile assembly plants, car shops, structural steel and general metal work.

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Portable Tool Co.**
DAYTON, OHIO



No. 207 HERCULES Drill. Speeds — 580 and 770 R.P.M. Capacities—drilling, $\frac{3}{4}$ " and $29/32$ "; reaming, $7/16$ " and $9/16$ "; nut setting, $\frac{1}{2}$ " and $5/8$ ". Weight—20 $\frac{3}{4}$ lbs.

Write for literature or ask for engineering counsel without obligation.



when the nut is threaded on the bolt and the ring rides free.

When vibration creates a tendency to back the nut off, the ring grips the bolt tightly in a contracting action against the face of the bolt threads. In effect, the ring is a floating nut thread, as shown in the illustration, free in one direction and contracting in the other. The nut can be removed readily with the aid of an ordinary wrench. An important feature is the fact that the nut is self contained with no extra parts required for the locking. The nut is standard thread. Sizes available range from $\frac{1}{4}$ in. to $1\frac{1}{2}$ inches.

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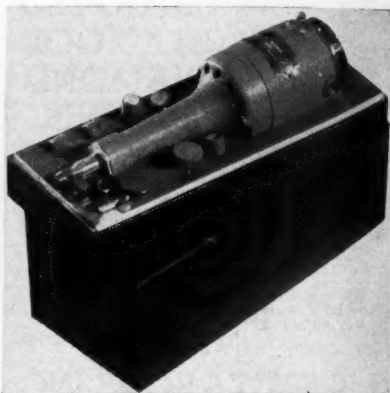
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Leading precision
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Ask also for catalog KNS illustrating more than 4,000 different Swiss precision files for hand work.

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Dumore No. 10 Hand Grinder

The hand grinder shown in the illustration is the No. 10, now being built for the trade by The Dumore Company, Racine, Wis. This grinder was originally developed for the especial use of a large



Dumore No. 10 Hand Grinder

automobile manufacturer, but the demand has since been so great that it has been added to the standard line.

The tool is powered by a $\frac{1}{8}$ h.p. dynamically balanced Dumore motor, the construction being of the three-bearing type in which selected precision grease sealed ball bearings are used. The tool operates at a speed of 20,000 r.p.m. The air used in the cooling of this tool passes through the snap or filter cap which prevents dust and dirt from entering the tool. A $\frac{1}{8}$ -in. collet chuck is built into the tool.

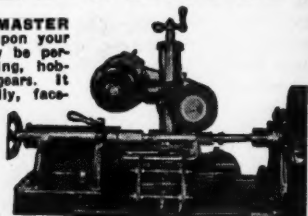
Equipment includes a set of mounted wheels, abrasive bands and arbor, wrenches, cord, plug and toggle switch,

Adjust Two Bolts and--PRESTO!

Your lathe becomes a machine of many functions. **THE MASTER LATHE CONVERTER** is precision built, is easily mounted upon your lathe and instantly becomes a universal tool with which may be performed such operations as milling, grinding, drilling, broaching, hobbing. It cuts keyways, spline shafts, gears. It hobs worm gears. It broaches internal keyways. It grinds internally and externally, face-plate and shaft grinding.

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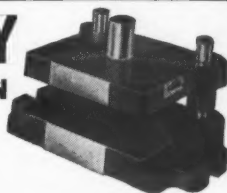


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Furnished in above type with graduations of .001", .0005", .0001".

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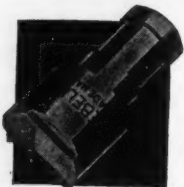
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which is built into the case. The tool weight 2 lbs. 12 oz.—light enough for all-day handling in the production line.

Lee Knock-Out Keyless Drill Chuck

The illustration shows one of a new line of chucks just announced by K. O. Lee & Son Company, Aberdeen, S. D. These new chucks are designed to meet the demand for a superior chuck to handle the heavy duty, precision, and high speed drilling required in modern shop practice.

Six distinct features make the chucks outstanding:



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2. Keyless: No tools, wrenches or keys are required for operation. A slight finger tip twist of the feed screw cap is sufficient to grip the drill as the chuck is self energizing.

3. Accurate: The design of the jaws and cone provides permanent and positive alignment. All parts contributing to accuracy, strength, and durability are hardened and finished ground.

4. Unlimited Durability: Simplicity of design, rugged construction with few working parts permanently lubricated make these the "Longest Life" chucks available.

5. Fast Action: Heavy feed screw with steep pitch and square cut threads require only a few turns of cap for full range.

6. Ball Bearings: Free action and easy release are assured even after the severest heavy duty drilling.

These chucks are adaptable to all types of drilling equipment. Five sizes are now in production: 0- $\frac{1}{4}$ -in., 0- $\frac{3}{8}$ -in., 0- $\frac{1}{2}$ -in., 3/16 to $\frac{5}{8}$ -in and $\frac{1}{4}$ to $\frac{3}{4}$ -in.



Lee Knock-Out
Keyless Drill
Chuck

Short Coupled Fostoria Machine Lamp

A short coupled localized lighting unit especially adapted for use where the space for the attachment is limited has been brought out by The Fostoria

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Scientifically designed to give extreme sensitiveness combined with ruggedness. The soft, smooth action of the Koch Test Indicator added to its high magnifying power makes it the choice of master toolmakers, machinists and inspectors. Two live ends—inside and outside to .001". Write for illustrated bulletin and prices.



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Save cost of hand counting with Productimeters on all production machines.

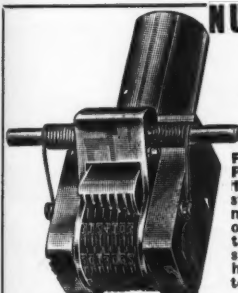
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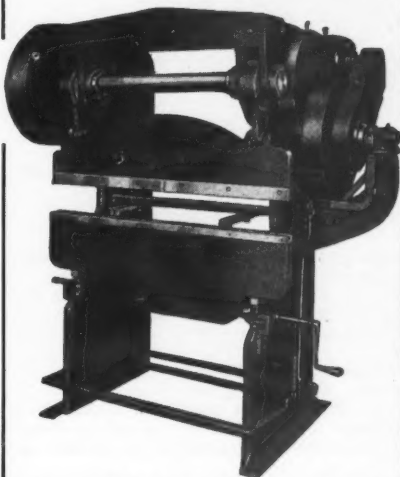
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No. 253



Does 40% to 60% of the forming work turned out by the average shop.

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

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ILLINOIS

Pressed Steel Corp., Fostoria, Ohio. As in the case of all Fostoria lamps, the reflector is joined permanently to the socket holder, which prevents the socket



No. 12 Fostoria Machine Lamp

from pulling apart. The No. 12 unit, which is shown in the illustration, is 12½ in. overall and is equipped with the regular No. 32S Shade Assembly which accommodates up to a 60 watt bulb. The No. 12C is 11½ in. overall and is equipped with the No. 16S Shade Assembly which accommodates 15 and 25 watt bulbs. Each unit is attached to a stamped base with two 11/32-in. holes for mounting, spaced 2 in. center to

center and assembled to a short tube 3 in. from the base plate to the center of the ball socket.

Both models are assembled complete with key socket, 4 ft. Underwriters' approved rubber cord and plug. The lamps are furnished in either dark green or machine gray.

Burgess Model 202 Phone Booth

A new de luxe phone booth, utilizing a sound absorbent lining instead of glass or wood panels, is the latest development of the Burgess Battery Company, Acoustic Division, 111 W. Monroe St., Chicago, Ill. It supplements their industrial booth, which is used extensively in noisy mills and factories.

The new booth is open around the base, and, due to the remarkable absorption of the Burgess Acousti-Pad lining, it requires no door. This feature of the design facilitates natural ventilation and easy cleaning, yet greater privacy is achieved than in ordinary closed booths. Noises which enter the booth are instantly absorbed. Sounds from within can only be picked up by the telephone transmitter.

This remarkable innovation in phone booth design, to be known as the Model

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—Cut Cost—

**of removing
broken taps
with**

WALTON TAP EXTRACTOR

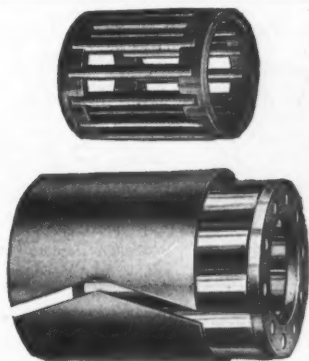
Here is a practical, indispensable tool for removing broken taps quicker than any other known method. When the tap breaks off at or below the surface of the work—simply insert the Walton Tap Extractor's fingers into the flutes of the broken tap and back it out, with no damage to the threads. This tool will usually pay for itself in removing the first broken tap.

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Any quantity.

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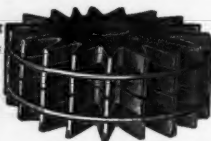
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202 booth, is constructed of steel and sound absorbent. It is furnished in three standard exterior colors—gray, mahogany brown, and flat white for any subsequent finishing by interior decorators. The interior wall finish is a warm cream color with white ceiling. The overall height is 85 in.; width, 32

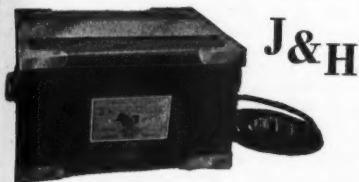


Burgess Model 202 Phone Booth

in.; depth, 42½ in. A concealed ceiling light is provided with pull chain socket. Two shelves are provided for holding the telephone instrument and directories. The Burgess Model 202 Booth may be grouped or ganged for multiple installations.

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An alloy developed for use on surfaces where high hardness and unusual resistance to abrasion are desirable and where high impact values and ductility are not important, known as Xaloy, is now being made available to the entire metal-working field through the Wilcox-Rich Division of Eaton Manufac-


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For Alternating Current

The J & H Demagnetizer requires no countershafts, belts, or other intricate electrical connections. All that is necessary is to plug it into the nearest lamp socket or receptacle.

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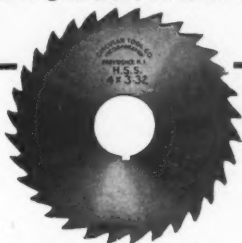
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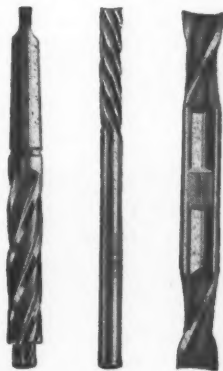
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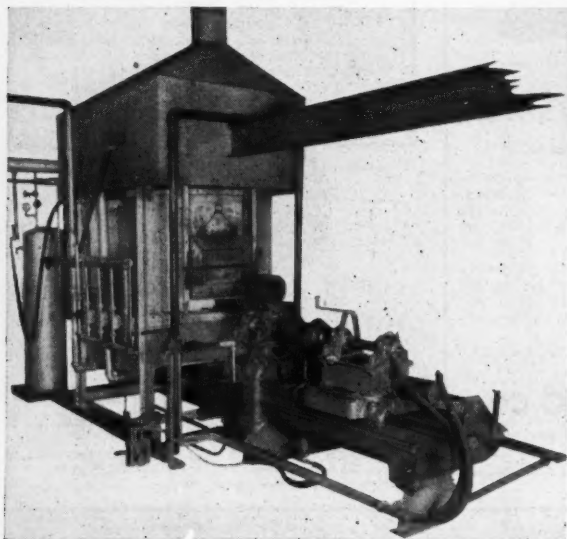


PUTNAM TOOL CO.

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turing Company, Detroit, Mich. Xaloy is said to have been used in oil well equipment for some time with remarkable success. It has a tensile strength of 43,000 lbs. per sq. in. and a compression strength of 240,000 lbs. per sq.



Gas-fired roll-equipped furnace with cone type centrifugal casting machine used in casting Xaloy on outside or inside surfaces.

in. Its coefficient of thermal expansion is 7.2×10^{-6} per in. per deg. F. and its thermal conductivity is 7.5 B.T.U.'s per hour per sq. ft. per deg. F. Its hardness is equivalent to 750 Brinell or 68 to 70 Rockwell C scale.

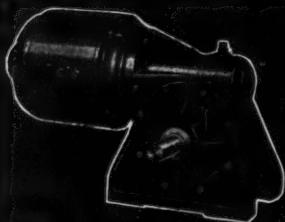
Xaloy is applied in a molten state to the outside or inside surfaces of bushings or other tubular pieces or to sur-

faces of flat pieces which are subjected to abrasive wear. A unique method of centrifugal casting has been perfected by Wilcox-Rich for this purpose. A perfect fusion bond is obtained. The Xaloy coating has uniform surface hard-

ness and uniform thickness. Due to the extreme hardness and abrasion resistance of this metal the thickness of the wall is controlled very closely to reduce to a minimum the finishing operation, for which special honing and grinding equipment is required. The resulting surface is mirror-like with an extremely low coefficient of friction.

Application of the alloy to irregular surfaces is accomplished by means of casting in permanent or sand molds or by the use of inserts faced with Xaloy. Narrow flat surfaces or edges are coated with Xaloy by the centrifugal method; sizes are, however, at present somewhat restricted.

Xaloy has met with outstanding success in a variety of applications. For instance, it was found that the life of tool bushings is lengthened 500 to 800 per cent. Exceptional results were also obtained, according to Wilcox-Rich by the use of Xaloy as an internal lining for honing control bushings which have a continuous wiping-wear on the inside diameter aggravated by the presence of abrasive compounds. Lining briquetting molds with this metal is said to have increased their life 400 to 500 per cent. This is a severe test inas-



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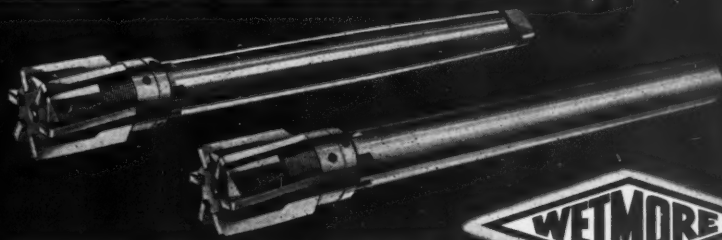
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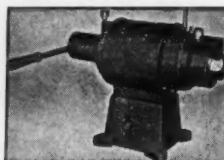
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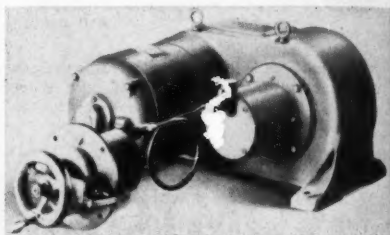
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much as cast iron turnings and borings are compressed into these cylindrical molds under a 300-ton pressure. Xaloy is said to have proved itself particularly valuable in cylinder liner installations where its high hardness and resistance to abrasion enable it to withstand wear under gruelling conditions.

U. S. Varidrive Motor With Hydraulic Remote Control

The U. S. Varidrive Motor illustrated, product of U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles, Cal., is now being made with remote control of



U. S. Varidrive Motor with Hydraulic Remote Control

the variable speed unit by hydraulic means. The operator can vary the speed of the unit over a wide range by turning the hand wheel at the remote control station. Being hydraulic, the control provides a smooth regulation of speed and an infinite number of speeds within the speed range provided. The liquid at the remote control cylinder station is forced through copper tubing to the cylinder at the variable speed unit itself and the movement of this cylinder changes the speed.

Staples-Type Carboly Reamer

Staples Tool & Engineering Co., 3541 Daytona Ave., Cincinnati, Ohio, is now marketing a reamer which is said to provide the rigidity and accuracy of the solid reamer with the economy of the expansion type of reamer. The shank of the reamer is of nickel steel and the taps are of Carboly. The reamer head is hollow to take a tapered plug which has wedge-shaped projections extending parallel to each other for the entire length of the plug. There are as many projections on the plug as there are blades on the reamer.

The expansion plug has a taper of 0.020 in., and when inserted into the



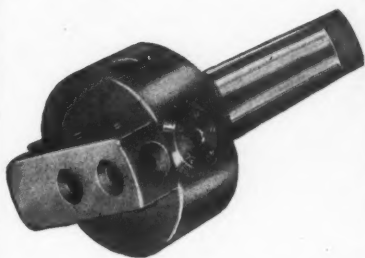
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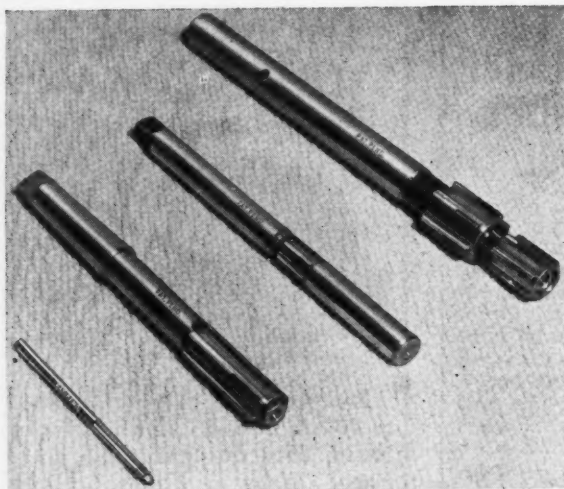


Fig. 1—(First tool at left) Staples-Type Straight Shank 0.250-In. Expansion Machine Reamer. (Second) Standard Staples-Type Machine Reamer. (Third) Staples Alignment Type Line Reamer. (Fourth) Staples Double Cutter Shell Type Reamer.

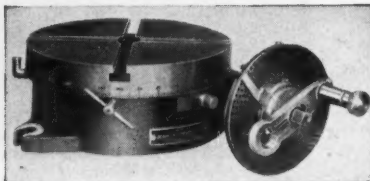
reamer, the wedges are aligned directly under the blades. When the expansion plug is driven into the reamer body, the metal of the body is stressed between the lines of contact. This causes the arcs of the body between the cutting blades to flatten and, as this occurs, the diameter of the reamer is increased and at the same time the lips are tilted back, increasing the clearance angle.

The range of expansion is up to 0.020 in., depending on the size of the reamer and the number of flutes. All that is necessary to expand the reamer is to drive the plug in slightly with a hammer. A hole is provided through the shank of the reamer so that the plug

and other assemblies where close tolerance is required.

The second tool from the left is a machine reamer which is expanded by driving the tapered expansion plug farther into the reamer body. The small tool at the left is a straight shank 0.250-in. machine reamer and is probably the smallest expansion reamer on the market. The standard range is down to $\frac{3}{8}$ in., but smaller tools such as the one illustrated can be made for special applications.

When specified, all of the tools in which an expansion plug is used are furnished with the plug flush for use in blind holes. Staples-Type Reamers



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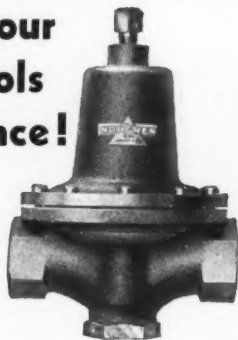
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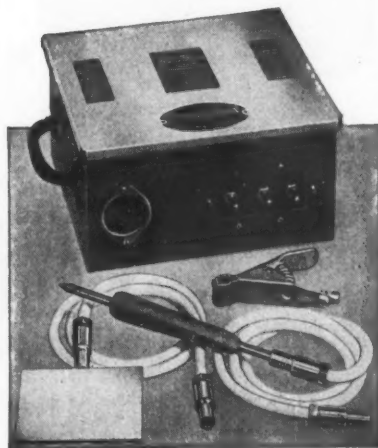
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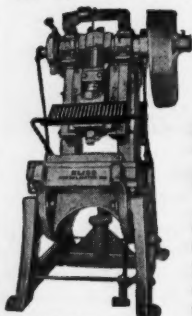


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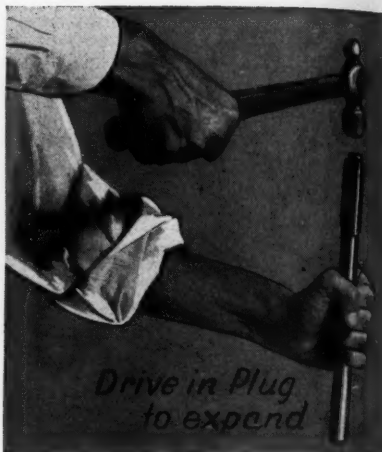


Fig. 2—The Staples-Type reamer is expanded by driving in the plug.

are supplied with conventional straight or tapered shanks, or with special shanks to suit the user's requirements.

Contrary to conventional practice of making all carbide-tipped reamers to order, Staples-Type standard machine reamers are stocked in oversizes, allowing prompt shipment of tools in accordance with the sizes specified by the customer.

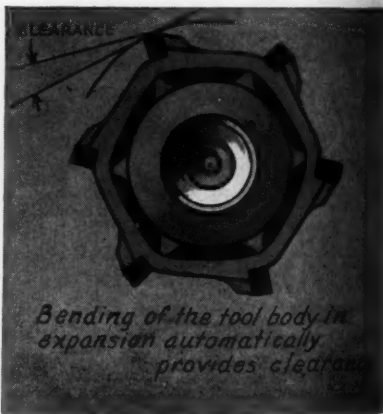
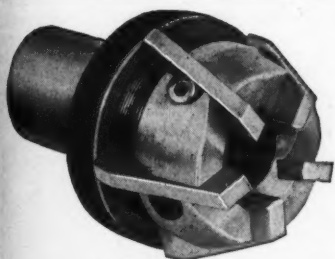


Fig. 3—As the tapered expansion plug is driven in, the arcs of the reamer body between the cutting blades flatten and the diameter over the cutting edges is increased.



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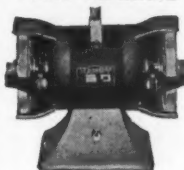
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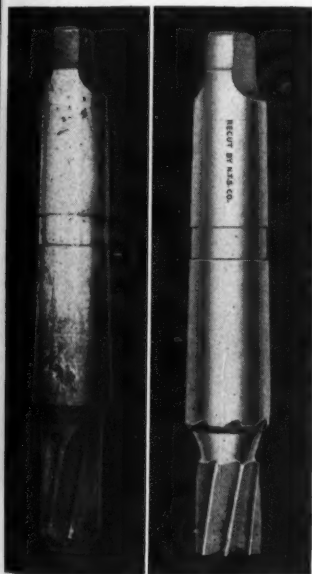
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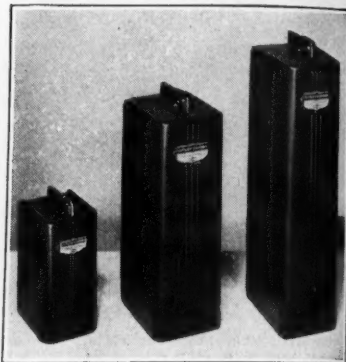
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Cutler-Hammer Fractional Horsepower Drum Controllers

A new line of fractional horsepower drum controllers is announced by Cutler-Hammer, Inc., manufacturers of electric control apparatus, 398 N. 12th Street, Milwaukee, Wisconsin. The controllers are for use with reversible A.C. squirrel cage motors and reversing or non-reversing multi-speed squirrel cage motors, driving machine tools and similar machines where speed regulation is desired.

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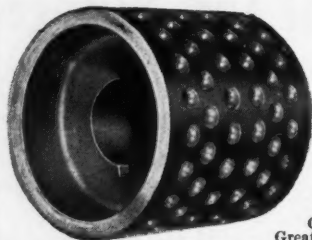
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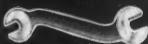
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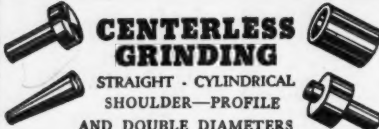
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Abrasive Cluster-Type Diamond Dressing Tool

Abrasive Dressing Tool Company, 1550 Broadway, Detroit, Mich., is now marketing a line of abrasive diamond dressing tools. The feature of the tool is the method used to set the diamonds. The process consists of setting the diamonds in a metal powder at pre-arranged intervals, the powder then being pressed in a die to a pressure 105,500 lbs. per sq. in. and extruded in briquette form. The briquette or powder slug is then sintered in a hydrogen furnace.

Since the powder is essentially a mixture of an abnormally stable and high melting point metal and a more active and low melting point metal, the sintering process bakes the stable metal to the diamond and firmly cements it with the more active metal. The process is accompanied by a 4 per cent shrinkage.



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The slug is then saturated and brazed to the setting with the more active metal. The diamonds are gripped with a mechanical pressure of 105,500 lbs. per sq. in., and a thermal shrinkage fit of 4 per cent. Actual micro-photographs show 98.5 per cent contact of metal to diamond in these tools as contrasted with an average 55 per cent contact for diamonds by the alternative methods of casting and brazing.

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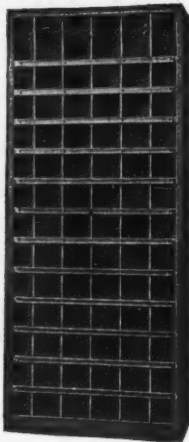
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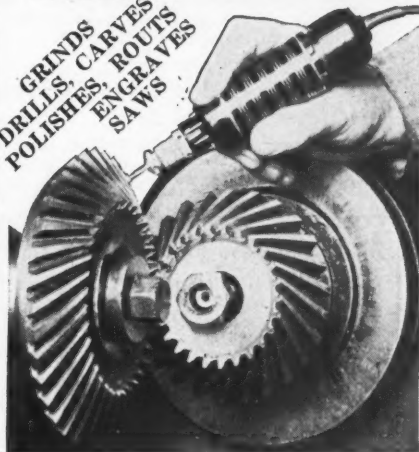
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ing, chipping and flaking of the diamond. The perfect contact between the diamonds and the matrix due to the "pressure shrinkage" process permits extremely rapid dissipation of heat from the diamonds to the matrix without the necessity of overcoming the resistant insulation of an imperfect fit.

Holo-Krome Socket Screw Wrench Set No. 33

Holo-Krome Screw Corporation, Hartford, Conn., has brought out a set of 11 wrenches especially designed for use

on No. 8 to 1-in. socket head screws. The wrenches are made of hardened steel, will fit all hexagon socket set screws from No. 8 to 1-in., cap screws from No. 8 to $\frac{1}{8}$ -in., and all sizes of



Holo-Krome Socket Screw Wrench Set No. 33

An All Purpose Air Velocity Meter

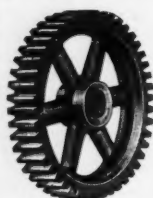


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**No Timing
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Illinois Testing Laboratories, Inc.
146 W. Austin Ave. Chicago, Illinois



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Immediate Delivery
Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.

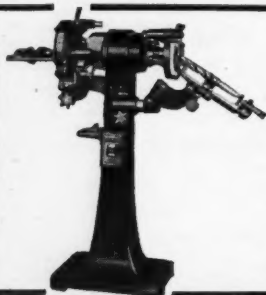
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CHICAGO GEAR WORKS
768-773 W. Jackson Blvd., Chicago, Ill.

stripper bolts. The wrenches are packed in a metal box $6\frac{3}{4} \times 4\frac{1}{2} \times \frac{3}{4}$ in. The box is made with reinforced corners and is fitted with a snap cover and standard hinges.

Dykem Steel Blue

A liquid blue made especially for use in laying out work on steel surfaces, called Dykem Steel Blue, has been placed on the market by The Dykem Company, 2301 N. 11th St., St. Louis, Mo. Dykem Steel Blue is a thin liquid which spreads quickly and evenly. Self-drying in a few minutes, it provides a perfect surface upon which to lay out a design or to perform machine work. The lines of



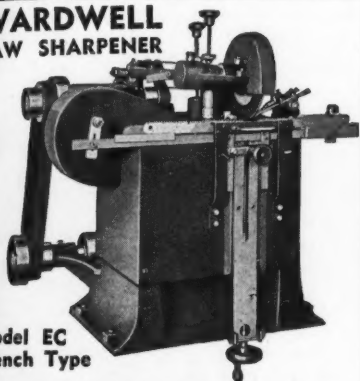
COMBINATION DRILL AND TAP GRINDER

● Reduce drill and tap breakage to a minimum. The saving on drills and taps alone pays a good rate of interest on your investment.

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WARDWELL SAW SHARPENER



Model EC
Bench Type

Automatically Sharpens Hack, Band & Circular Saws

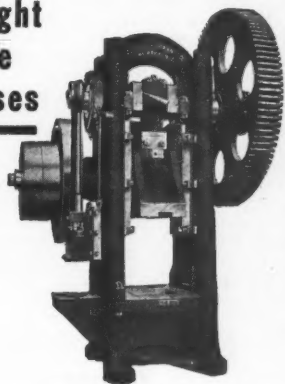
with teeth as fine as 32 to the inch,
at a speed of 30 to 75 per minute.
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Straight side Presses



Outstanding in every detail for
heavy blanking and forming work.
All stresses are taken centrally.

Write for new catalog illustrating and
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Zeh & Hahnemann Co.

184 Vandelpool St.

Newark, N. J.

*"The Blade in the
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**Have YOU Investigated
the superior craftsman-
ship and economy of
LENOX BLADES?**

**Order a box now. Note
the improvement in your
workmanship and effi-
ciency.**

the layout, when scribed on the metal, appear in bright relief like threads of silver on a blanket of blue. The soft blue color is said to be restful to the eyes as it absorbs the harmful light rays.

Dykem Steel Blue is also said to be helpful in locating high spots on gears or bearings. It adds practically no thickness to the metal, but, being resistant to moisture and oil, it affords a certain amount of protection from atmospheric conditions. It will not injure any metal and may be removed instantly with a special solvent made for this purpose. Dykem Steel Blue is marketed in hermetically sealed cans in pint, quart and gallon sizes.

Cesco No. 90 Healthguard Respirator

Recently developed, and approved by the United States Bureau of Mines, is a respirator for use particularly in Type "A" dusts (those tending to produce silicosis). This bears the name of Cesco No. 90 Healthguard Respirator and is an entirely new development.

The filtering element removes all dust, even of microscopic fineness, yet allows

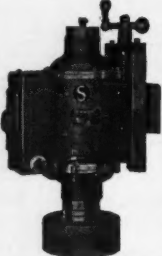
free passage of air. There is only one filtering surface, of large area; and a supersensitive outlet valve permits no



Cesco No. 90 Healthguard Respirator

inside air pressure. Hence users report no apparent resistance to easy breathing.

Of equal importance with the filter, as a precaution against breathing dust,



STANDARD VERTICAL ANGLE PLATE GRINDER

For Planer, Boring Mill, etc., 2 H. P. to 10 H. P. sizes.
Tool Post and Angle Plate Grinders for Lathes, etc.
Write for complete catalog showing Electric Drills, Heavy Duty Grinders, Disc Grinders, Buffing and Polishing Lathes.

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GEM VISES



Swivel or Plain Base
Double capacity over ordinary machine vises. One piece hand wheel and nut—extra long thread. Hardened tool steel jaws, reversible for V-groove or plain surface. Write for circular. Jaws 6 3/4" wide . . . 2 1/2" deep . . . open 6 3/4".

J. E. MARTIN TOOL & DIE WKS.
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QUALITY **Strand** SERVICE

FLEXIBLE SHAFTS & MACHINES

SIXTY TYPES AND SIZES 1/8 TO 2 H. P.

Covering Hundreds of Operations
Manufactured by

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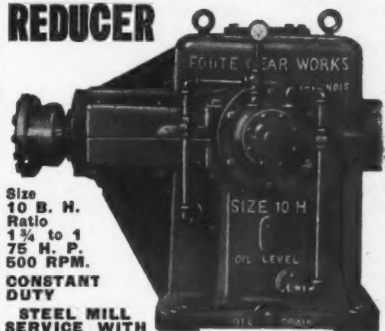


U. S. Drill Heads are made in standard and special sizes. If your job requires special drill heads, our years of specialization in this work will save you money and assure an accurate, dependable and swift job. Send your blue prints for estimates.

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SPIRAL BEVEL GEAR REDUCER



Size
10 B. H.
Ratio
1 1/4 to 1
75 H. P.
500 RPM.

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STEEL MILL SERVICE WITH PRESSURE LUBRICATION

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Make the Mac-It test. Write for free samples.

STRONG-ARM JOE SAYS:



WE CALLED 'EM LOTS OF NAMES

Mac-its
PRONOUNCED
"MACK-ITS"

The Only COMPLETE Line of
Heat-Treated, Alloy Screws

THE STRONG, CARLISLE & HAMMOND CO., 1392 W. Third St., Cleveland, Ohio

We used to call 'em safety screws, then hollow safety, then hollow hex—and now hollow set screws. But, through all these years and changes, there's one name that's stuck "MAC-ITS." MAC-IT screws always have been alloy steel, the same in all sizes and types—then properly heat-treated. Yes, we've called 'em lots of names, but no bad ones. MAC-ITS are old friends of ours.

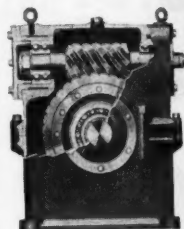
is the seal at the facial contour. This seal is effected with the aid of a soft metal band which serves the additional purpose of so reducing the headband pressure that it is no longer noticeable.

The respirator is manufactured by the Chicago Eye Shield Company, 2300 Warren Blvd., Chicago, Illinois.

Foote Bros. No. 7 HG Hygrade Worm Gear Speed Reducer

Foote Bros. Gear & Machine Corporation, 5301 S. Western Blvd., Chicago, Ill., has augmented its line of Hygrade

Worm Gear Speed Reducers with the No. 7 HG, which has a center distance of $7\frac{1}{4}$ in. with ratios of $3\frac{1}{2}$ to 1 up to 2450 to 1. Horsepower ratings range from $\frac{1}{2}$ to $27\frac{1}{2}$ h.p. in single reduction and output torque ratings of 12,600 to 21,000 inch pounds in double reduction types. Single reduction horizontal, single reduction vertical and double reduction types are available. With the addition of the No. 7 HG, the IXL Hy-grade line covers a total range in horsepower capacities of .06 h.p. to 200 h.p. on single reduction types and corresponding capacities on double reduction types.



Foote Bros. No. 7 HG Hygrade Worm Gear Speed Reducer

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ALL SIZES
ALL SHAPES
SPECIAL
MACHINES,
PARTS, JIGS,
TOOLS,
FIXTURES,
HIGH CLASS
TOOL WORK
Since 1918



Varick Machine & Tool Works, Inc.
306 Hudson St. New York City

New Literature

Gisholt Standard Tools for Nos. 3, 4 and 5 Ram Type Universal Turret Lathes. This 40-page catalog now being issued by Gisholt Machine Company, Madison, Wis., presents the complete line of chucking tools, bar tools, cross slide tools, chucks, collets, and machine attachments for turret lathes made by this firm. Included are multiple and single turning heads, cutter holders, facing heads, slide tools, adjustable recessing and boring tools, reamer holders, boring bars, shell reamers and bars, bushings and centers, and facing and forming tools, tap holders, collapsing types, self-opening die heads, indexing square turret tool posts, tool bit holders, three and four jaw chucks, taper attachments, turret facing attachments, and many other tools. Copy free upon request.



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A self-contained, rugged, quick-acting, accurate and handy portable precision pyrometer, indispensable in any MODERN non-ferrous foundry. Reduce spoilage and secure UNIFORM SOUND CASTINGS. Patented clamping device stops the pointer at correct indication — a PYRO feature. Write for bulletin No. 50.

PYROMETER INSTRUMENT COMPANY
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NO OTHER PUNCH & DIE RETAINER HAS AS MANY Advantages of Design, Construction, and Operation as the HOVIS SCREWLOCK

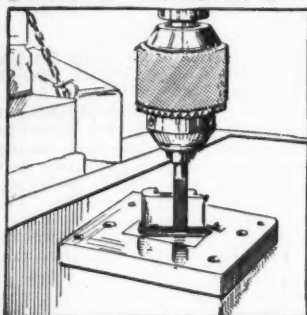
1. Positive Accuracy—Straight Thrust and Pull Action. 2. Longer Life of Punches—No Side Strain or Wear. 3. Assured Economy of Time—Ease of Punch Removal and Replacement. 4. Punches Inexpensive—Easily Shop-Made with Straight Side Cut. 5. Construction Simple and Rugged.

Group plates of any size or number of punches.
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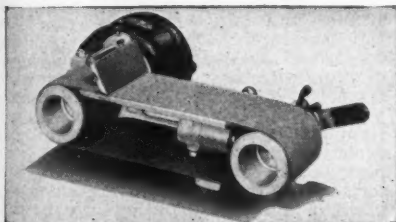
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"PRO FILE"

**ROTARY FILES
SAVE MONEY**



Rotary Filing Punch in Drill Press
70 SHAPES & SIZES IN STOCK
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• NEW An Inexpensive ABRASIVE BAND GRINDER . . .

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with **ALEMITE LUBRICATION**, complete with grease gun.

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NEVER A FAILURE!

Not ONE U. L. Model Knock-Out Welder has EVER failed in service from any cause. This includes machines on heavy production lines, on maintenance work, and in shops. The initial cost is low and operation varies from only 3 to 15c per hour. Why experiment or be content with obsolete equipment? Write for bulletin W36C.

K. O. LEE & SON CO.

ABERDEEN, S. D.

Boston Ratiomotors. This 32-page booklet, now being distributed by Boston Gear Works, Inc., North Quincy, Mass., contains complete descriptions and specifications of the line of Boston Ratiomotors made by this firm. Each type is illustrated, the text calling attention to the various details of design. Copy free upon request.

Ajax Flexible Couplings. Ajax Flexible Coupling Co., Westfield, N. Y., is issuing a set of data sheets covering all standard couplings manufactured by

this company and bound for the convenience of the engineer, draftsman or purchasing agent. Technical information covering details of construction are presented, together with blue prints showing the design and dimensions. Tables of specifications for each type of couplings are also given. Copy free upon request.

Niagara Handy Reference Booklet for Sheet Metal Work. Niagara Machine & Tool Works, 695 Northland Ave., Buffalo, N. Y., is now distributing a 24-page catalog in which are presented the brakes, folders, combination bench machines, boring, turning, wiring, crimping and beading machines, grooving machines, slip roll formers, squaring shears, gap shears, lever punches, circle shears, and other tools made by this firm for sheet metal manufacturing. Illustrations of each of these various types of tools are included, together with descriptions and specifications. Copy free upon request.

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FOR ECONOMY



All types for dressing grinding wheels, shaped Diamond Tools, etc. Large stock unset stones on hand. Resetting and resharpenings returned same day received.
Send for price list and specify your requirements.

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Minimize—waste, error, spoilage, rejects. Check surface temperatures, processing and treating ovens, pouring point of non-ferrous metals—hundreds of uses.

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RUSSELL ELECTRIC CO.
338 W. Huron St., Chicago
Shipped prepaid to rated firms on thirty days approval.

Hold-Heet Pyrometers



\$16
COUPLES
EXTRA 1 to 3

LANCE
TYPE

Colonial Dual Ram Surface Broaching Machines. Manufacturers operating plants of the production type will be interested in a four-page folder, now being issued by Colonial Broach Company, 145 Jos. Campau Ave., Detroit, Mich., which describes the dual ram surface broaching machines made by this company. Designed for multiple operation broaching and for high production with heavy cuts, the two rams travel in opposed directions and make possible the maximum of production from one operator. The two rams may perform different operations on the same part, or the same operation can be performed by the two rams on identical parts, or different operations can be performed on two different parts. The folder contains illustrations, complete description and specifications. Copy free upon request.

NICHOLSON
EXPANDING MANDRELS



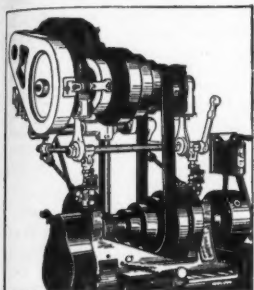
They act as internal chucks for holding work while being machined on lathes, millers, grinders or shapers. Made in 14 different sizes, taking bores of every fractional part of an inch from 1/2" to 7". Sold either singly or in sets. Bulletin 530.



CONTROL VALVES in 2, 3 and 4 Way Types for operating single and double acting air, steam, water or oil Cylinders, made in Lever, Foot, Solenoid and Motor Styles, for pressures up to 300 lbs. Hydraulic Valves lever operated up to 5000 lbs. Other products—Arbor Press, Flexible Couplings, Steel and Stainless Steel Ball Floats, Steam Traps, Steam Separators, High Pressure Air Vents.

W. H. NICHOLSON & CO.

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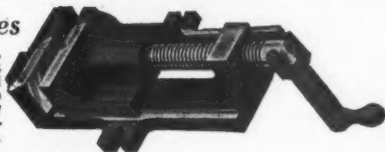
No need to scrap your present equipment. With Remco Motor Drives you can motorize any of your present machine tools as they stand—make them independent of line shaft location, or operation—save your original investment. Saving in belting alone very often pays for a complete Remco installation. Get details! Write! Manley Products Corporation, State & Hay Sts., York, Pa.

REMCO MOTOR DRIVES

ELIMINATE SPECIAL AND COSTLY JIG FIXTURES

By Using Yost Drill Press Vises

They are heavily constructed and very compact. Three flanges on the base permit easy attachment to machine or drill press table. A "V" shaped slot milled in the movable jaw permits a positive locking of vertical work. The ease and simplicity in operating makes this tool an indispensable factor in the execution of drill press operations.



Write us for circular "H", giving us name of your nearest dealer.

YOST MANUFACTURING COMPANY, MEADVILLE, PA.

KEEP FLOORS CLEAN



You will be astonished at how inexpensively and quickly you can clean floors with Oakite Penetrant. An ounce or two to the gallon of water removes oil drippings from machinery, leaves floors clean, safe to walk on. Easy to mop up, too!

Write for FREE booklet giving further details of this and other money-saving Oakite materials for production cleaning, burnishing, grinding, rust proofing.

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Branch Offices and Representatives Located in All Principal Cities of the U. S.

with **OAKITE PENETRANT**

Vibro-Insulators. Catalog Section 7900 issued by B. F. Goodrich Company, Akron, Ohio. This four-page folder, perforated for inclusion in a loose leaf catalog binder, describes and illustrates the Vibro-Insulators which are now being marketed by this firm for application on mechanical equipment to absorb shock and vibration and to reduce noise. The Vibro-Insulator is fabricated from rubber bonded to metal, providing the strength of the metal combined with the sound-damping qualities of rubber. A copy of this section is available to any mechanical executive upon request.

Bond Speed Reducer Booklet GA-48. A 20-page booklet designated as "GA-48" which gives detailed information on Bond Stock Speed Reducers has just been issued by the Charles Bond Company, 617 Arch St., Philadelphia, Pa. Fourteen different types of speed reducers are listed and illustrated. Ratios range from 5:1 to 2500:1; fractional horsepower units are especially featured. Copy free upon request.

K-C 1/3 H.P. Single Phase Motors. Kingston-Conley Electric Co., 60 Brook Ave., Plainfield, New Jersey, is now is-

suings a circular describing the 1/8, 1/4 and 1/3 h.p. single phase, split phase and three phase motors built by this firm. In addition to the illustrations, the circular describes the construction of the motor in detail, including a centrifugal starting switch, oversize ball bearings ventilating system, line switch and so on. Specifications and prices are included. Copy free upon request.

Barnes Red Arrow High Speed Steel Hack Saw Blades. This four-page folder, now being issued by W. O. Barnes Co., Inc., 1297 Terminal Ave., Detroit, Mich., presents the outstanding features and characteristics of the Barnes Red Arrow High Speed Steel Hack Saw Blade, gives instructions for the use of this blade in cutting various kinds of metal products, and closes with a table of specifications for the sizes, widths and prices of the different blades. Copy free upon request.

Tool and Cutter Grinding Wheels. In this six-page folder, now being issued by Abrasive Company, Tacony & Fraley Sts., Philadelphia, Pa., is included a wheel selection chart for tool and cutter grinding and general recommendations. The chart lists all the various types and kinds of tools and specifies the kind of wheel that should be used to obtain the best results in the sharpening of these tools. The text includes a discussion of the characteristics of Borolon, SB Borolon, and Green Grain Electroton wheels, together with an explanation of the identification system and the relation of the identifying letters and figures to the kind of abrasive used, grit size of abrasive particles, type of bond, method of manufacture, amount of bond, density or porosity, particular bond used, and the failure or treatment.

This folder should be in the hands

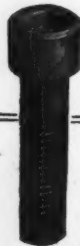
The Mummert-Dixon Spot Facer



...enables you to machine accurate and smooth surfaces on small bosses, etc., in less time than by any other method. Better investigate! Send for a bulletin.

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"Buy Economy — You'll Effect Economy"



**SOCKET HEAD
CAP SCREWS**

*Milled
from Bar*



**SAFETY HOLLOW
SET SCREWS**



*Made of
Alloy Steel*

ECONOMY MACHINE PRODUCTS CO.

5216 Lawrence Avenue

Chicago, Ill.

Many Plants Choose—


Bond

Cast Iron (Semi-Steel)

STOCK GEARS

for Greater

STRENGTH

Ask for Catalog G-58

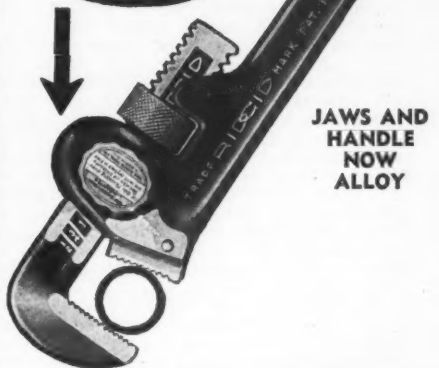
CHARLES BOND COMPANY
 617 Arch Street Philadelphia, Pa.

L-R *everlasting*
FLEXIBLE COUPLING
 NON-LUBRICATED

 Type 1A for small shafts.
 3/16" to 2 3/4". Silent,
 smooth running, highly effi-
 cient. Low cost. Other types
 to 14". Write for test sample.

LOVEJOY FLEXIBLE COUPLING CO.
 5007 West Lake St. Chicago, Ill.

Champion Steel Racks


 Write for Specifications and Prices
WESTERN TOOL & MFG. CO.
 SPRINGFIELD, OHIO

**JAWS AND
HANDLE
NOW
ALLOY**
A GUARANTEE
that Cuts Your Wrench
Repairs 75%

 And that adjusting nut spins freely in open housing in all sizes, 6" to 60". The replaceable jaws are non-slip non-lock, made of chrome molybdenum alloy with handy pipe scale on the hook jaw. Try one and you'll see why **RIGID** is the most popular make in the world.

Ask Your Jobber

THE RIDGE TOOL CO.
ELYRIA, OHIO, U. S. A.
RIGID
PIPE TOOLS

of every buyer or user of tool and cutter grinding wheels. Copy free upon request.

Industrial Wiring Survey. Continuous and abusive usage of the electrical systems in industrial plants has produced varying degrees of deterioration, obsolescence, hazardous conditions, and functional inefficiencies. Changes and plant additions also outgrow the capacity of existing wiring facilities to perform economically. Before these conditions can be corrected, however, it is necessary to ascertain the facts by planned investigation. To aid in making an adequate survey of existing conditions, Anaconda Wire and Cable Company, 25 Broadway, New York, N. Y., is distributing a set of forms and instructions which have been worked out to facilitate investigation of the condition of electrical equipment and wiring in industrial plants from the standpoint of the ability to carry load, surplus or spare capacity, system defects, safety and obsolescence.

Instructions are included as to the logical procedure for making such a survey, convenient space is provided for recording findings and recommendations are given for plans or plot sketches of

the existing layout. It is believed that such a study, faithfully followed through, will disclose the weaknesses—if any—in the electrical system and become a permanent record for determining what parts of the system may be extended under pressing conditions. Copies free to plant executives or engineers.

Monarch Accessory Catalog. A 44-page catalog has just been issued by the Monarch Machine Tool Company, Sidney, Ohio, entitled: "Accessories for Monarch Lathes". As the name suggests, this catalog pictures and describes in a dramatic and interesting manner, the many accessories obtainable with the various types of Monarch Lathes.

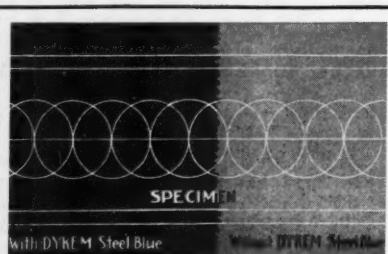
Those who have seen this catalog say that it is, in every sense of the word, a "picture book" because liberal use has been made of photographs that are not retouched but that have been "painted with lights". This catalog is unlike many books designed to serve the same purpose, in that it tells a quick factual story in picture form. Copy has been minimized in order that the appearance of a general magazine might be maintained to a great extent.

Copies of this catalog may be obtained on request.

Link-Belt Silent Chain Drive Data Book. The 1936 edition of Link-Belt Data Book No. 125, containing 96 pages of descriptive matter applying to Silver-streak Silent Chain Drives of fractional horse power up to 2000 h.p. has been completed by Link-Belt Company, 519 N. Holmes Ave., Indianapolis, Ind. The new data book is 8½x11-in. page size and in its manner of presentation reflects the progress of approximately five years since the preceding edition of this book was published.

The book contains directions for simple efficiency tests which may be applied to present methods of power transmission in order to discover opportunities to cut production costs. Twelve simple check-ups are suggested and graphically portrayed. Plant engineers will value these two pages in particular.

The table of contents includes installation pictures, engineering data recommended drive selection, lubrication and casings, dimensions of chains and parts, list prices of chains and wheels, dimensions of wheel rims, hub sizes, bores and keys, chain adjusters, breaking pin hubs, electrical data and so on. Copy free upon request.



DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in a sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information
THE DYKEM COMPANY
2300 N. 11th St. ST. LOUIS, MO



HANDY RACKS

Save time and steps by keeping your bar stock, pipe, shafting, etc., on these **HANDY RACKS** along-side the operator. Keep stock neatly piled and assorted — instantly available — can be checked at a glance. Shipped on approval. Write for details.

Wm. S. Yohe Supply Company

505 Mahoning Rd. Canton, Ohio

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For more than 30 years, **GERSTNER Tool Chests** have been the choice of Machinists, Tool, Die and Pattern makers. This is an outstanding record! You can choose the right model for your good tools from Free Catalog.

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1264 Columbia St. Dayton, Ohio

"OUTWEARS
the best
Bronze Metal"

20 years without a drink—



ARGUTO OILLESS BEARING CO.

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"HALLOWELL"
STEEL TOOL STANDS

These stands go right to the scene of the job . . . keep tools safe and in order, eliminate the confusion of the old-fashioned, traveling tool box. Time savers, money savers—they have a definite place in your shop. Write for details.

Fig. 705 — "Hallowell" Steel Tool Stand. With or without casters. Very handy around machine shops, service stations, garages, etc. Carried in stock. Write for Bulletin.

Immediate Delivery!

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BOSTON		CHICAGO
DETROIT		ST. LOUIS
INDIANAPOLIS	BOX 556	SAN FRANCISCO

Abrasive Products Booklet. Abrasive Products, Inc., South Braintree, Mass., is now offering a 36-page booklet in which its Jewel Brand abrasive products are described. Jewel Brand abrasives are listed in specification tables in which sizes, grits, and prices are given. All of the abrasive products listed in this book are said to conform with the recommendations of the Division of Simplified Practice of the United States Department of Commerce. Copy free.

ATC Bulletin G-12. The Automatic Temperature Control Company, Inc., 34

E. Logan St., Philadelphia, is now issuing a bulletin designated as G-12 which describes the Current-Input Controller for close regulation of electrically heated devices such as furnaces, ovens and platens. This control device was described in a preliminary bulletin No. 136 which was issued a year ago. The new bulletin presents additional information in regard to its use for different applications, with wiring diagrams and ratings. Copy free.

Page Hi-Tensile F Electrode Bulletin No. DH-984. This

booklet which has recently been issued by the Page Steel and Wire Division of American Chain & Cable Company, Inc., Monessen, Pa., describes the Page shielded arc electrode in detail and the shielded arc method of welding. Illustrations show clearly the procedure for various types of welds. The Page Hi-Tensile F Electrode is said to be a general purpose electrode of the shielded arc type suitable for all welding operations. A copy of booklet No. DH-984 will be sent free upon request.



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Bristol Belt Lacing. The Bristol Company, Mill Supply Division, Waterbury, Conn., announces the publication of a new folder, Bulletin No. 725, covering Bristol's Steel Belt Lacing. Prices, sizes, etc., are included for the various types of Steel Belt Lacing manufactured by this company as well as information concerning the use of the various types. A copy of the bulletin will be sent upon request.



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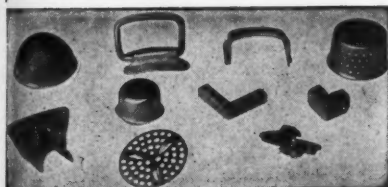
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Randall Pillow Block Catalog. Complete specifications and installation data on six types of pillow blocks, including a new universal-position model, are contained in the 1937 catalog just issued by Randall Graphite Products Corporation 613 West Lake St., Chicago. Five of the bearings are of the self-aligning type. Of these, the Standard and Pedestal models have single reservoirs, while the double reservoir oil return feature is offered in three models, the D.R.O.R., the D.R.O.R. Flange type and the D.R.O.R. Universal. There is also a D.R.O.R. Rigid pillow block.

The description of each type of bearing is accompanied by detailed speci-

cations. Also included are descriptions of oil cups, bronze safety collars and fibre washers and insulated rubber mountings. The catalog is especially designed for the convenience of engineers, superintendents, shop foremen and others responsible for the design and maintenance of machinery and shop equipment. Copy free upon request.

Safety Appliance Catalog. Announcement has been made by the Mine Safety Appliances Company, Pittsburgh, Pa., that its newest catalog has been released. This Catalog (No. 5-B) is devoted exclusively to the general industrial safety field, a separate volume (No.

5-A) having been prepared for the mining industries and released in the latter part of 1936. In thus cataloguing its products separately for the greater convenience of users in both fields, the company is influenced by the differing requirements and applications between the fields, and the need for individual treatment of specialized items.

The book is 128 pages in length, generously illustrated and fully descriptive. It represents the most comprehensive cataloguing of industrial safety equipment ever attempted and includes all the latest developments in safety work, some of which are of exclusive nature.

Inquiries for individual copies of the new Catalog should be addressed direct to the Mine Safety Appliances Company, Brad-dock, Thomas and Meade Sts., Pittsburgh, Pa.

Copies are free to mechanical engineers and executives.

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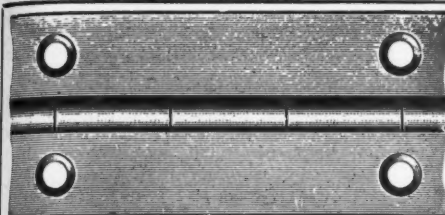
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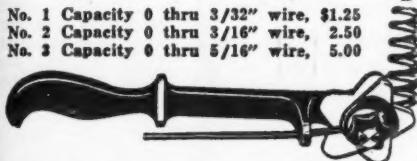
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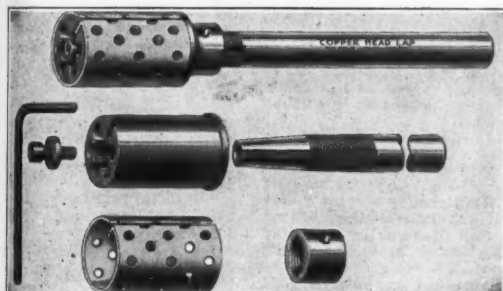


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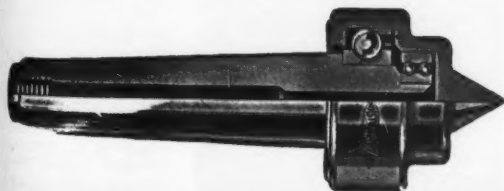
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Fairbanks-Morse Bulletin 616D. Characteristics and applications of the duplex power pumps, made by Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill., are discussed in detail in Bulletin 6160, now being issued by this firm.

Fairbanks-Morse duplex power pumps, with self-oiling power end and valve deck type fluid end, are offered in two complete lines: Standard General Service and Heavy Duty. Standard General Service pumps are available in sizes of 2½ to 3 in. by 4 in. and 2½ to 6 in. by 6 in., with capacities to 215 gal. per min. at pressures to 250 lb. Heavy Duty

pumps, with sizes 2½ to 3½ in. by 4 in. and 3 to 4 in. by 6 in., have capacities to 93 gal. per min. at pressures to 500 lb.

F-M power pumps are available as basic pumps, for belt drive with tight and loose pulleys, chain driven by top-mounted motor, with tandem-mounted motor and Flex-Mor V belt drive, and with F-M type Z gasoline engine. Both the power and pumping units for each of these combinations are manufactured by Fairbanks, Morse & Co., affording undivided responsibility for operation. Pumps can be adapted to various service demands by changing the size of pis-

tons and removable liners, and using special valve services, piston packings and construction materials. Copy of the bulletin free upon request.

Century Single Phase Motors, in sizes from ¼ to 40 h.p., are described in detail in an eight-page folder now being distributed by Century Electric Company, 1810 Pine St., St. Louis, Mo. Besides the descriptions and illustrations of the motors and their various parts, the bulletin presents data regarding advantages of the repulsion start induction brush lifting single phase motors. The characteristics of these motors are brought out and the advantages of the particular design used is explained in detail. Copy free upon request.

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Oct. 10th, 1936

It gives me great pleasure to answer your letter of the 6th. inst. and state that we are well satisfied with the metallizer that we bought from you almost two years ago.

We have built up shafts, pump pistons, pump rods, valves, steam engine pistons and rods, air compressor pistons, pump cross head hoes, crank shafts, worn grader wheels to receive new bearing races, cracked motor cylinders and heads outside, and numerous other articles, all with success.

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We receive the Metallizer Magazine and get lots of good information out of it.

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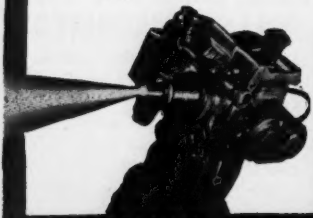
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